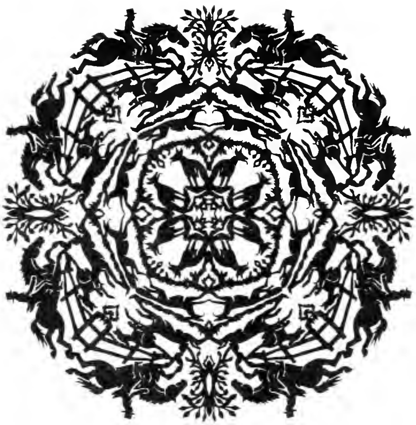

THE

OUTLINES

OF THE

VETERINARY ART;

OR, THE

PRINCIPLES OF MEDICINE,

AS APPLIED TO

THE STRUCTURE, FUNCTIONS, AND ŒCONOMY,

OF

THE HORSE,

AND TO

A MORE SCIENTIFIC AND SUCCESSFUL MANNER OF TREATING HIS VARIOUS

DISEASES:

COMPREHENDING, ALSO, A CONCISE VIEW OF THOSE OF

NEAT CATTLE AND SHEEP.

ILLUSTRATED BY ANATOMICAL AND SURGICAL PLATES.

BY

DELABERE BLAINE.

Third Edition,

COMPLETELY REVISED, AND ENLARGED BY IMPORTANT ADDITIONS AND NEW FIGURES.

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Page 511, for the head line "Hydrophobia," read *Rabid Madness.*

The few Typographical and the more numerous Orthographical and Syntactical Errors which have escaped the Author's notice, he trusts the candid Reader will rectify and excuse.

PREFACE.

THE VETERINARY OUTLINES having passed through two large Editions, and a Third being now called for, it remains for me to assure that Public under whose kind patronage it has thus flourished, that no endeavours have been wanting on my part to render this Third Edition also worthy of the same reception, by making it a summary of all the additional experience I have myself gained, and of all the improvements projected or carried into effect by others. That such public patronage may not be thought to be granted without some discrimination, I may add that the Work has now been translated into almost every European language, and that from some of the most celebrated Continental Veterinary Schools the Author has received the most flattering testimonials of the estimation in which it is held. A new Plate has been added on the Operation of Neurotomy, together with a full Account of the Method of performing this popular addition to the Veterinarian's practice, and the Cases to which it is applicable.

PREFACE TO THE SECOND EDITION.

FOURTEEN years have elapsed since the first appearance of this Work, during which period a very extensive veterinary practice may be supposed to have enabled me to make many important additions to it, particularly to its practical part. In fact, the present Edition has been entirely recomposed; and some subjects which entered into the former, and which may be, perhaps, as conveniently gained from other sources (as a History of Human Medicine, a Treatise on Comparative Anatomy, &c.), have given place, in the present, to a more minute Examination of the exterior Conformation of the Horse; a philosophical and mechanical Inquiry into the Nature, Cause, and Manner of Progression; a comprehensive Treatise on Condition, Dieting and Stable Management, &c.; which alterations, it is presumed, will render the work as interesting and useful to the amateur as to the practitioner and veterinary student. To this Edition has also been added a Veterinary Materia Medica: if, therefore, in its former dress, it received the following honourable testimonies to its merits, it is hoped that, in its present improved state, it will be no less favourably received, and will prove still more extensively useful.

'Mr. B—— had previously published the Anatomy of the 'Horse, re-published in this Work, in which he professes the 'parts treated of have been most of them taken from his own 'dissections. So far he has a fair claim of originality.'— 'The drawings appear extremely correct; are executed in 'the most handsome manner; and the descriptive part is 'equally entitled to praise.'—*London Medical Review.*

'The second division of the Work is occupied with the 'Anatomy of the Horse, including the physiology, or know-'ledge of functions. This part of the Work is materially 'illustrated by engravings, the execution of which has con-'siderable merit.'—'The third division is allotted to the 'practical part of the veterinary art, or a description of the 'diseases of the horse, ox, sheep, and dog, with the most 'approved modes of cure. From the length of the anato-'mical part of the work, the present part is, perhaps, more 'compressed than might be wished. The classification 'adopted by the author will materially assist the student in 'this branch of medicine, who is too apt to be misled by the 'barbarous and unmeaning jargon adopted, in general, in 'books of farriery.'—*Medical and Chirurgical Review.*

'Mr. BLAINE, we believe, is the first who has attempted, 'in the English language, a systematic view of the whole, 'founded upon scientific principles, in conformity with the 'modern discoveries in anatomy and physiology; and with 'the modern theories, concerning the nature and causes of 'the different morbid changes which the living frame under-'goes.'—'In treating of each disease, he gives a clear and 'accurate description of its symptoms; points out its causes, 'states the degree of danger, and usual modes of termination; 'and subjoins a simple, rational, and scientific plan of cure. 'What a pleasing contrast this forms to the miserable pro-'ductions entitled "Stable Directories," "Complete Far-'riery," &c., every page of which is crammed with farragoes, 'called recipes; certainly not inert, but often possessing a 'potency of the most dangerous sort!'—'It appears to us, 'that this Work is the best and most scientific system of the 'veterinary art that has hitherto appeared in this country; 'and we therefore recommend it to all who are desirous of 'acquiring a competent knowledge of the structure and dis-'eases of the horse, and other domestic quadrupeds.'—*British Critic.*

To the above testimonies it may be added, that this work has been translated into French, German, and Italian, by the order of the Veterinary Colleges of France, Germany, and Italy. The *Moniteur*, of the 25th July, 1804, contained a very copious review of this work by M. Peuchet, the celebrated French Professor, and which ended with the following summary:—'Nous pensons à la maniere claire et simple dont 'l'auteur a traité chaque objet, qu'il a rempli son but; que cet 'ouvrage a le double mérite d'être à la portée de tous de tous 'les genres de lectures; que les personnes dont la profession 'est de faire la médecine des animaux se priveraient d'un 'grand secours en négligeant de le consulter, et qu'il peut 'très utilement servir a ceux qui se livrent a la plus impor-'tante branche de l'économie rurale, celle de l'education des 'bestiaux.'

INTRODUCTION.

IF the animals domesticated by man be essentially necessary to his comfort and convenience, no apology need be offered for attempting to reduce into a system the arts of preserving them in health, and of removing their diseases; both of which must be founded on a knowledge of the structure and functions of the animals in question: and it is these, therefore, that form the groundwork of what is called the *Veterinary Art*.

The deplorable state of this art in Great Britain has, until lately, been animadverted upon by every one who has written on the subject; and the principal cause of complaint appears to have been its total confinement in the hands of persons proverbially ignorant. Custom reconciles the grossest absurdities; and hence, though the value of the animals in question, and particularly of the horse, is a theme that has exercised, in every age, the pen of thousands; yet the knowledge of the means of preserving them in health, and of curing their diseases, has, till of late, been regarded as a subject beneath the dignity of a man of education, and the practice as derogatory to the character of a gentleman. Thus every improvement that was at these times witnessed, made its way by stealth, and crept into notice by the exertions of some enlightened physician or surgeon, as Gibson, Bracken, Bartlet, and Osmer.

But, at length, superior to vulgar prejudices, mankind are content to consider this among the liberal arts, and to regard the profession and practice of it as no longer incompatible with the pretensions of the scholar, or the rank of a gentleman: much has been already done by the establishment of a Veterinary College, and the exertions of its *elèves;* and it will undoubtedly continue to rise in dignity and utility.

Nevertheless, these scholastic improvements must necessarily be slow and difficult of general diffusion; therefore, any more summary mode of teaching this branch of the healing art systematically, must prove highly beneficial to the world at large. The possessors of horses of every description will be interested therein; particularly those of rank and fortune, whose leisure may permit them to become acquainted with the fundamental principles of the art, by the acquisition of which, they will be enabled to direct in cases of emergency for themselves. Medical men, in general, are interested in such a production, for their opinion is often required on cases in which analogy totally fails, but in which they might otherwise be willing to act and prove useful*.

To farriers, it is needless to say how valuable such a work may become: the awakened attention of the public to the gross errors of their general practice, has convinced many of them of the necessity of receiving instruction, but which the very nature of their situation prevents them from seeking at the seminary established for that purpose. To diffuse, therefore, that art among all ranks of persons, which the Veterinary College is attempting among individuals, is the intention of the present work; and it is evident, that in such an undertaking a very wide field of research must be entered into. To teach the art properly, there must be a groundwork laid down; the anatomy of the body must be known, together with the laws of the animal economy, its deviations from health, the causes of these deviations, the progress of return towards a healthy state, and the modes of hastening this return. By these means, practitioners will be taught first to think and then to act; and instead of having a system of far-

* The medical world, in general, are more interested in the welfare of the veterinary art than may be at first apparent; and, although the superstructure of such art has been principally raised on the base of human medicine, yet it is more than probable it will finally repay all the benefits derived from its parent by the important facts elicited from its own practice. Among the advantages to be derived from a fair parallel drawn between the two arts, even in its present state, we may instance the beneficial employment of *blisters* in numerous cases of veterinary surgery, where they are almost unthought of in human practice; as, in obstinate strains arising from ligamentary extensions, &c. &c. Neither is it impossible but that the use of the actual cautery may become as extensive an agent in human as in brute surgery, from an observation of its powers in the latter; and that active internal diseases also may be combated, as in Java and Japan, by the employment of actual fire. The benefits derived from the practice of neurotomy hold out a prospect of a new era in medicine, equally perhaps useful and important to the one as to the other.

riery in their closets only. it will exist in their minds. The former writings on this subject, however good, are but few of them direction posts to improvement; on the contrary, they are themselves the extent of what they profess to teach. To compass the end I wish, an arrangement of instruction, gradatory and systematic, will be attempted. It will be proper first, by a history of the art, to shew that it is defective, as it has hitherto been practised among us. And, when the present state of the art has been examined, and the necessity of a more scientific manner of pursuing it has been pointed out, it will lead to our ultimate object, which is to teach the mode by which these defects may be remedied.

The generality of farriers, unfortunately, are not willing to be put to the trouble of learning, nor to the mortification of owning that they need it; hence they obstinately maintain, that nothing is necessary but what is already known; and that theirs is purely a mechanical art, learned by imitation, and even descends in perpetuity from father to son.

But farriers should be aware that there is no mortification in candidly pleading ignorance; on the contrary, ingenuousness would ennoble them. Nor should this useful body hastily conclude, that those who teach the reformed practice are at war with their persons, or wish to lessen their employment; on the contrary, they combat only their errors, and, when they point out the methods by which these may be corrected, they at once heighten their respectability, and increase their practice. I am disposed to think, that the term *veterinarian* has had some share in promoting this hostility; but it should be well understood by farriers, that, however desirable it is that they may be enabled to attend a regular course of veterinary instructions at the National School established for that purpose, yet, that a residence there is by no means necessary to even their proper assumption of this term of art, provided that they, by extending their researches beyond the mechanical process of a ferrier, farrier, or shoer of horses, deserve it. The Veterinary College is not invested with the power of giving this or that appellation; they collect and condense the means of attaining the art on proper principles: but although not so conveniently, certainly, yet the means they pursue are in the reach of other persons: THEY possess no secret arts. The book of nature and the practice of art are equally open to the meanest farrier, if he pursues investigation upon equally excellent principles, and equally fit him to become a veterinarian.

There are farriers who are sensible, intelligent men, and conscious of their own defects; but there are many of a contrary cast, ignorant, assuming, and obstinate: these pertinaciously hold out against improvement, and virulently contend that the system, as at present practised, cannot be mended, though their practice itself fatally proves the reverse. These persons look on every attempt at improvement as an unjust innovation on their right, and, on every exposure of error, as an attack upon their persons. We find one of them saying, 'Whatever may be written by those new-fangled farriers, of 'the advantages resulting from a minute knowledge of anato- 'my, nothing in their practice has proved its utility; and as 'Gibson has so well demonstrated the anatomical structure of 'the horse, nothing further on the subject is necessary, and 'cannot tend to elucidate the practical part of farriery.' Such an apology for ignorance of a subject that all writers in every age have allowed is the groundwork of improvement, would excite surprise, were it less common than it is; but, as this is the general language of many of this class, it may be worth while to indulge a few moments in comparing the differences between the old and the new practice.

By dissections of morbid subjects, we can accurately ascertain the effects of inflammation on the lungs, and by this very anatomy it is that we are now taught, instead of treating horses with cordial balls, and "*comforting*" drinks, whereby such inflammations are certainly forced into gangrene, and then '*the horse died rotten, rotten as a pear, and had long been unsound;*' instead of such a destructive practice, which has been in common use, we now give no cordials, but we bleed and blister profusely; and if we are luckily employed in time, we certainly save our patient. To pursue the matter further; anatomy taught the principal seat of glanders to La Fosse, beyond the possibility of doubt: subsequent investigations have thrown still greater light on this subject, and, as the knowledge of anatomy has been further extended since his time, so it was to a less advanced state of it that we must attribute the important error he propagated, when he described the lymphatic glands for the sublingual. Bartlet adopted this error; and from a defect also in anatomical knowledge, he likewise fell into a still more barbarous one, when he directed that the haws should be cut away from the eyes, considering, as spongy excrescences, what we now know to be necessary and important parts. The different diseases of the bowels are all not only illustrated by morbid anatomy, but we have thereby been enabled to make the important distinction between inflammatory and flatulent cholic; this has also led to the detection of the fatal practice in use among farriers, of giving gin, oil of juniper, &c. in the former cases. It is by anatomy we know that molten grease is no stirring up or melting of the fat of the body, which has been a most gross and dangerous error of long standing; but that it is simply a throwing out of coagulable lymph, or the white parts of the blood, on the surface of the intestines, in consequence of inflammation; and hence our treatment is now judicious and beneficial. It has taught us, likewise, that strong physic is always dangerous, because what was mistaken for fat, is only the effect of inflammation. In our amended practice, we do not attribute to an affection of the shoulders that which we now know to arise from tenderness of the feet. Thousands of suffering victims have been tortured by applications to these parts for chest-foundering, when the evil existed in contracted hoofs; which, by thus standing inactive and heated, became worse for the treatment. Innumerable other instances might be adduced, would our limits allow of detail.

The subject-matter of the Work I have divided into *Four Parts*. The *first* of these comprises what may be termed the collateral branches of the art, commencing with a General History of Veterinary Medicine from its origin to the present time; and a concise account of those who have contributed, by their works, to its improvement. To which succeeds a summary of its progress in this country, by which the reader will be enabled to judge how far we stand removed from other nations in this particular, what they may be supposed to have borrowed from us, or we to have learned from them. Next, is presented a short detail of the proper means to be pursued for the attainment of the Veterinary Art. Thirdly, a minute examination of the exterior conformation of the Horse. Fourthly, a philosophical and mechanical inquiry into the nature, causes, and operations of progression. Fifthly, a treatise on condition; and, Lastly, the principles and practice of stable management, with its components, dieting, grooming, and exercise.

The *second* division of the Work presents an anatomical detail of the parts of the body of the *horse;* the description of which is blended with a physiological account of the functions and economy of the parts, and of the morbid states into which they are liable to fall; and, as the knowledge of the extremities forms one of the most essential points in the practice of farriery, I have described them separately, that the practical remarks on them might come into one point of view. I have illustrated the anatomical part of the Work with plates, as I deem them of the greatest possible assistance to the acquirement of anatomical knowledge, particularly where recourse cannot be had to the subject itself; and, as they were all drawn by myself from my own dissections of the dead subject, I can venture to assure my readers they are correct. In the parts represented, I have endeavoured to form such an arrangement, as that those most important, either in elucidating the economy of the animal, or as more immediately concerned in the practice of the art, may be particularly brought forward and represented.

The first and second divisions are formed into sections; the third is subdivided into classes; and the fourth presents itself naturally in one mass. I have made use of the terms that are usual in human anatomical descriptions, but I have in the Index, as well as throughout the description, introduced the synonima of the farriers; and it will appear, whenever it has fallen to my choice, I have used the English and popular terms; for I am averse to seeking the reputation of a scholar, were it even in my power, at the expense of those plain unlettered classes who may be benefited by it. Other classes can comprehend it in a plain as well as a classical dress, but these can understand it in no language but their own.

The *third* division of the Work is allotted to the practical part of the veterinary art, or a description of the diseases of the *horse, ox,* and *sheep,* and the mode of cure, which comprises two parts. The first, speaking with analogy to the human, comprehends that practice which falls under the cognizance of the physician; and the second, that which is usually confined to the surgeon. I have likewise attempted something like a classification of diseases; not, I am convinced, so perfect as it might be, but such as I conceive the present state of the science best admits of. Had I attempted a more strictly nosological arrangement, I might have bewildered the uninformed, and, perhaps, have lost myself: but a classification of diseases has great advantages, for, as some remote parts of the body follow the same laws in structure and economy, so they are liable to similar diseased affections. The inflammation of mucous membranes produces similar appearances in many respects, whatever part of the body it takes place in. The inflammation of the cellular membrane producing phlegmon and abscess, is the same, whether it occurs on the cheek or on the buttock; hence a knowledge of these diseased affections can be rendered more comprehensive by their being classed under one head, than when suffered to remain scattered through all the varieties to which, from the different parts affected, they have hitherto been. This classification forms twenty heads or classes; ten of which include the medical part of the art, and ten belong to the surgical; after which, the operations that occur in farriery are introduced.

The *fourth* division comprehends a full account of the articles in use among veterinarians as medicaments. A Veterinary Materia Medica is particularly wanting, that the junior practitioner may not be misled into a belief that a few articles only of trifling expense are requisite in the practice of his art.

I have added a very copious Index, that, by this means, those subjects that are otherwise disjointed, may come into one point of view: by this, the whole that has been said on any article throughout the Work, appears at once; by this, likewise, the reader will be enabled to find immediately any subject he wishes, under any term that is familiar to him, as the subjects are arranged under all the names in common use, as well under such as are more scientific.

OUTLINES

OF

THE VETERINARY ART.

Sect. I.

HISTORY OF VETERINARY MEDICINE.

MAN, ever ready to improve surrounding objects to his advantage, would not be long without subjecting to his use such animals as his reason led him to suppose would prove most useful, or his experience had proved were the most tractable. Animals, when domesticated and removed from a state of nature, could not long continue in perfect health; and hence their owners were led to search for such remedies as their small stock of information pointed out: thus veterinary medicine must, in some degree, have been coeval with the domestication of the animals in question. Homer, who flourished nine hundred years before CHRIST, celebrates the management of the Greeks with regard to their horses, and the pains that were bestowed to train them for their courses. Xenophon, a Greek philosopher, poet, and warrior, wrote a treatise on equitation, *De Re Equestri,* nearly five hundred years before the birth of CHRIST, in which he quotes several authors who had written on the same subject long before; from which we may naturally conclude the treatment of the diseases of the horse had been attended to before these periods. The term *veterinary* appears, also, a very antient one, as may be learned from the relics of literature, saved from the devastations of the barbarous ages; in which are frequently met with the terms *veterinarius,* and *veterinarius medicus,* but which, it is argued, apply strictly to those who undertake the medical treatment of beasts of burden only: they are now, however, understood as applying to the diseases of brute animals in general. The French use the term *vétérinaire* for the science of animal medicine in general, and Hippiatre, for that which treats of horses. '*Hippiatre, médecin du cheval; d'ippos, cheval, iatros, médecin.*' Dict. d'Hippiatrique*. By the investigations of Democritus and Hippocrates, attention was turned, in some degree, towards anatomy, or the internal formation of the body; and, as these early researches were practised only on brutes, so it naturally

* The terms veterinary and veterinarian have occasioned some dispute among the learned. An enquiry of this kind is foreign to my purpose: the French are great sticklers for terms; and we see the respectable name of Huzard to a work entitled—*Notice sur les mots Hippiatre, Veterinaire, et Marechal.*

led, at times, to an observation of the morbid appearances which presented themselves, and which must have paved the way for attempts at counteracting their diseases. That it did so is very evident; for, we are informed, this subject was, at this time, deemed so important, that the great Hippocrates himself wrote a treatise on veterinary medicine. It farther appears, from antient testimony, that it was usual for the most celebrated physicians to make this art a part of their study, and that many of them practised indiscriminately upon man or beast.

'On peut aussi remarquer que ces deux médecins des 'hommes & des brutes, étoient autrefois exercées par une 'même personne; Apsyrtus nomme souvent un médecin de 'chevaux, & quelquefois simplement un médecin. Ansi, au 'commencement du 1 livre, il y a pour inscription, Apsyrtus 'à Hippocrates, médecin de chevaux, salut; & au chap. 22, 'Apsyrtus à secundus, Médecin de chevaux salut: au chap. '42, Apsyrtus à Statilius Stephanus, médecin salut; & au 'chap. 69, Apsyrtus à Hegesugoras, très-bon médecin, salut. 'Tous ces hommes là, pratiquant la médecin sur les chevaux, 'consultoient Apsyrtus touchant leurs maladies les plus im'portantes.'—*Dict. d'Hippiatrique*, tom. ii, p. 411.

It will appear from this, that the veterinary art was deemed, at this early time, both important and honourable; and that it was as regularly practised as human medicine, not only by physicians in general, but, probably, by persons set apart for the purpose. We have not, however, any written remains of importance on the subject till after the Christian æra; from which time several antient fragments have been preserved. Valerius Maximus mentions one Herophilus, a farrier, *equarius medicus*, who had written; but his works have not been preserved. It was fifty years only after the birth of CHRIST, when Columella wrote his celebrated treatise, in which he mentions an eminent cotemporary author, Pelagonius, but of whose works I believe we have no remains. From this time, till about the third century, we have little transmitted down to us, but the names of some of those who either practised or taught this art. Nevertheless, these testimonies are sufficient to shew that, from the earliest ages, veterinary medicine was in the highest estimation.

About three hundred years after the birth of CHRIST, the true father of this art appeared; the veterinary Hippocrates, *Vegetius*, who wrote his *De Arte Veterinaria*, which became the oracle of many succeeding ages, and upon which even many of the future improvements were built. Vegetius likewise gives an account of all the most celebrated authors and practitioners before him, among whom are Columella, Apsyrtus, Chiron, and Pelagonius. The art appears to have gained little in addition for several centuries subsequent to this;

though some writings on it are known to have appeared, of which we have only extracts remaining, and for which we are indebted to Constantine Porphyrogenet, who commanded that all the works on this important subject that had appeared should be collated, and the substance of them formed into one body, for the future guidance of practitioners, and the preservation of the antient opinions. A copy of this compilation, by some means, escaped the general devastation that afterwards took place, as well as a copy of Vegetius; and it is to these we are principally indebted for our knowledge of the state of this art in antient times.

On the restoration of civilization and learning which followed the irruptions of the barbarous nations, iron shoes began to be worn by horses; at which time, by an association only to be excused by the state of the times, the treatment of the diseases of the animal became the province of the maker of his shoes; and what medical assistance was wanted for other beasts was gained from goatherds, shepherds, &c. But in the sixteenth century, when Europe became still more enlightened, and the liberal arts encouraged, the necessity of a more strict cultivation of this useful branch appeared evident. Francis the First ordered the collection of Constantine's to be translated from the original Greek into Latin by Ruelli, a physician; from which it was soon afterwards rendered into Italian, German, and French; and by this means became dispersed over Europe. Nearly at the same time, likewise, the works of Vegetius were translated into several languages: and, from this period, we may date the gradual improvement of the art; as a proof, many treatises upon the subject appeared in different parts of Europe; among which, and deserving of particular notice, may be reckoned that of the celebrated historian Gessner, who compiled from Aristotle, Pliny, Ælian, Oppian, Varron, Columella, Vegetius, and others, an extensive history of animals, enriching it with some valuable remarks on their diseases. Vincent, an Italian author, published recipes for the cure of all the maladies of horses in the first half of this century; and soon after the celebrated works of Laurentius Ruffius appeared in Latin. The latter half of this century produced the natural history of ruminant animals, with the phenomena of rumination, by Æmiliano, published in Venice. *Libro de marchi de cavalli, Venice* 1588; *Hippol. Bonacossa, tractatus, equorum, Venice* 1590; as well as *L'Hipposteologie, par J. Hernard, Paris* 1599. It was, I believe, in this century also, that the celebrated and learned Leonarda da Vinci, an eminent Italian painter, published his anatomy both of the human body and of the horse, which works are extremely scarce: there was a copy of the latter, I believe, in the late queen's library. This illustrious author is not usually mentioned in histories of medicine; though, at the time his works appeared, they far surpassed in merit those of all his cotemporaries.

During the seventeenth century, the veterinary art gradually advanced, and numerous publications on the subject were elicited from various hands; as those of Cæsar Fiarchi, Pasqual Caracciolo, Clementi Corti, Ruini, Dumesnil, Beaugrand, Delcampi, Epinay, Liberati, Debaurepert, Hobokeni, Peyeri, Blasius, Solleysel, and others. Fiarchi wrote an Italian treatise on horsemanship, in which he introduces a very rational method of shoeing, forbidding the use of calkings as destructive to the feet, but, where they are absolutely necessary, he recommends a small one only on the outside heel. The *infermita, & suos remedii, del Signor Carlo Ruini,* was published in Venice, 1618. It is from this celebrated and elegant work that Snape, Gibson, and most of the French authors, have copied their anatomical plates. I never saw but one copy of it, but I was surprised at the elegance of the drawings, and, considering the time they were published in, their correctness. In 1654, the *Grand Maréschal Francois,* a very large and meritorious work, appeared: it was said to be composed by several hands. In 1675, Gerard Blazius, a Dutchman, published, in Amsterdam, a treatise on the anatomy of the horse, with plates, which was highly spoken of. In the latter end of this century, 1698, the art received a very great addition from the elaborate work of Sollysel, whose attention was drawn to the subject from his situation as manege or riding master, in whose hands the treatment of the diseases of the horse was at this time very generally confined; we therefore observe, that almost all the treatises on this subject, of this century, are united with the practice of the manege, and the modes of riding; and it is to this unhappy union of arts, conducted by persons not medically educated, that we must attribute the little improvement in veterinary medicine during this century. Sollysel was the first who objected to burning for the lampas, as dangerous and absurd. He first reprobated the bleeding in the palate in fever as useless, and pregnant with mischief, from the liability of wounding the palatine artery. He taught the impropriety of introducing feathers with stimulating substances into the nose, as the inflammation occasioned might produce ulceration and the glanders. He likewise pointed out the danger and folly of tying down the testicles, when they were drawn towards the abdomen by pain and irritation, but directs that means should be used for lessening the irritation.

The eighteenth century will ever make a distinguished figure in the annals of history, for the great advances that took place in the liberal arts in general; among which none experienced a greater alteration than Farriery. As commerce drew wealth into countries, and luxury followed riches, so the number of horses increased and their value augmented. The writers of this century were numerous; I shall notice only the most eminent. In 1734, Mr. Garsault translated Snape into French. In the same year, I. and G. Saunier, two Dutch practitioners, published a celebrated veterinary work. In 1742, the Amphitheatrum Zooticum of Valenti appeared. It was about the middle of this century, also, that several of the continental countries, opening their eyes more fully on the importance of this branch of science, established seminaries for the purpose of teaching it scientifically. One of the first, as well as the most eminent of these, was established at Lyons, over which was placed the celebrated Monsieur Bourgelat. Monsieur B. was a voluminous author. In 1750 he published his Elements of Farriery, in 3 vols.; in 1765, his Materia Medica, for the use of the veterinary pupils. Soon after, his Elementary Treatise on the Anatomy of the Horse appeared, which is the most complete work of the kind that had then appeared. In 1766 he published his Elementary Botanical Demonstrations, for the use of the pupils of the veterinary college. He likewise gave to the world a treatise on bandages applicable to the horse. About this time, likewise, the King of Sweden granted some honourable privileges to those who professed this art, which drew to that country some of the best practitioners from France and other countries. In 1752, appeared the celebrated work on Natural History composed by Messrs. Buffon and Daubenton; which, as it contained many hints on the conformation of animals, and on their economy and diseases, therefore may be ranked as an acquisition to the art. About this time likewise was published the well known work of Guereniere, but which had no merit as a veterinary treatise.

As a cotemporary with Bourgelat lived the elder La Fosse, a name that will ever be respected in the annals of veterinary medicine. La Fosse made numerous improvements and discoveries, which he usually communicated in the form of memoirs to the Royal Academy of Sciences in Paris. In 1754, he collected these into one volume, which was quickly translated into other languages, a sufficient proof of its merit. The first of these memoirs describes the foot and its diseases. The second is the celebrated communication on the glanders, wherein he considers it to be a local inflammation of the pituitary membrane, and recommends the use of the trepan; but which, it has been said, was not a new mode of treatment, it having been practised in England before. The third of these memoirs described the use of the lycoperdon, or puff-ball, in hæmorrhages. The fourth contained his celebrated improvements in shoeing; and the fifth exposed the error of attributing an epidemic, then prevalent, to the bite of the shrew mouse, which was the generally received cause. Most of these were translated into English by Bartlet, and from them it may be judged how much the art was indebted to him. In 1755 appeared Garsault's *Parfait Maréchal,* which Buffon frequently quotes; but it appears not to merit any distinction in this place. In 1756 there was published, in Paris, a translation from the Swedish, of an Essay on the Raising and Perfecting Cattle, which was very highly spoken of, but which I have never met with. It was at this time, likewise, that the first grand Dictionary of Arts and Sciences came out, in which M. Bourgelat and Genson were engaged. It appears that the veterinary articles furnished by these gentlemen occasioned some controversy; for we afterwards find some remarks on them, published by M. Rondon, farrier to the great stables of the king. In 1763, the *Maison Rustique* made its appearance in Paris; but the author was not generally known. About this period, also, some treatises on different parts of the art were written by Brecand, Boutrolle, Le Clerc, Barbaret, a physician; and Bartlet's works were translated into French at the same time.

In 1766, La Fosse, junior, who occupied the same situation his father had held (that of farrier to the lesser stables of the king), presented his *Guide du Maréchal,* a work well known in this country, though it has never been translated into English. The anatomical part is concise, and accompanied with some good plates. But his principal production was the *Cours d'Hippiatrique,* which was then, and still remains, the most expensive and superb work that has appeared on the subject in any language. It consisted of sixty-five folio anatomical plates, coloured after nature, with corresponding descriptions in letter-press, and first appeared in 1772. After this he published his *Dictionnaire d'Hippiatrique,* in 4 vols. This valuable work is but little known in England, but at the time it appeared it was certainly the best practical system of farriery in existence. In 1776, appeared a very extensive work by M. Vitet, who styles himself doctor and professor in medicine. Had the execution of this been equal to the plan on which it was intended to be formed, it would have been an excellent one; but with a very elegant systematic arrangement, which he borrowed from a foreign author, and a most extensive collection of subject, it is but an indiscriminate compilation of good and bad. Its principal merit consists in an analysis of authors, to which I am indebted for an acquaintance with the names of many of those who have written on this subject. There was about this time published, in Spain, a very voluminous work on veterinary medicine, in nine volumes; but of which I know no particulars.

After the death of Bourgelat and La Fosse, we hear of no character of any eminence for some years; but it appears, that, since the revolution, the subject has again been diligently studied, and the names of Hartman, Chabert, Huzard, &c. &c. &c. stand forward. Soon after, or about the time above alluded to, there appeared a considerable work, called *The Rational Dictionary of Medicine, Surgery, and Farriery*, in 6 volumes; and very soon after a *Veterinary Dictionary*, by Buchoz, but which had not merit equal to that of La Fosse. In 1787, Monsieur Chabert published a *Treatise on the Mange* of horses; he afterwards wrote on the Peripneumony of black cattle, and on several other subjects. There also appeared an essay on *the Grease* of horses, which gained the prize medal of the society for the promoting the health of animals; to which was joined a report on *chest affections* and *broken wind;* but I do not know who was the author. In 1788 there came out a *Treatise on the Haras*, with the method of shoeing, cutting, and all the lesser operations, translated, from the Spanish of Hartman, by Huzard. Likewise, *Instructions and Observations on Domestic Animals*, with remarks on breeding, rearing, buying and selling the same; with an analysis of previous authors, by Chabert, Flandrin, and Huzard.

The above authors have also published, conjointly, a *Veterinary Almanack*, containing the history and progress of animal medicine, since the establishment of the veterinary schools. In 1791, Monsieur Lompaigieu Lapole, veterinary surgeon, published *Observations on the Health of the Animals of St. Domingo*, dedicated to the Veterinary College at Alfort. In 1797, Monsieur Chabert and Monsieur Huzard published, by order of government, a *Treatise on ascertaining the Existence of the Glanders, the Means of preventing it, and destroying the Infection.* In 1809 appeared *Cours Complet; ou Dict. Universel d'Agriculture, Pratique d'Economie, Rurale et Domestique, et de Medécin des Animaux*, par l'Abbe Rozier.

From this time to the present the writings on the veterinary art have become so numerous in every country, that no limits would suffice to notice them. In the course of the present work, many of the most popular will be quoted. The names of Tessier, Dupuy, Gohier, Huzard, jun. and Girard, immediately present themselves as voluminous and meritorious writers: many others I do not recollect, but the curious on this head may receive every information by a reference to the Veterinary Catalogue of Madame Huzard's extensive Library, No. 7, Rue l'Eperon, Paris.

I shall conclude this History by a slight notice of the public seminaries established at various periods on the continent for the instruction and dissemination of this valuable art. The first of these was established at Lyons in 1762, and was placed under the inspection of M. Bourgelat. It occupies a large space, and employs a director, and several professors. The infirmary, which is spacious, is intended to receive domestic animals of all descriptions. It has a botanical garden, laboratory, theatre, and museum.

Next in order of time, but first in order of importance, is the Veterinary College established at Alfort, near Paris, in 1766, by that father of the art, Bourgelat. It is at present under the immediate inspection of M. Huzard, whose son, himself a veterinary professor and author of celebrity, kindly accompanied me on a visit to it this autumn. This excellent establishment forms not only a model for all others, but under its roof almost all the professors of other continental veterinary schools have received their education. The present building being in a dilapidated state, is about to be replaced by a more extensive and appropriate erection. It comprises extensive hospital boxes and standings (bailed) for horses and other domestic animals, over which are apartments where the pupils are lodged. Three noble galleries are appropriated; the upper to an extensive veterinary library; the next to a museum of anatomy, with numerous splendid specimens, but which, for want of a museum conservator, are in a state of decay. The lower apartment is occupied by some stuffed specimens in natural history, philosophical apparatus, a curious collection of veterinary instruments of every form and age, a collection of the shoes of every country, morbid specimens, &c. &c. Other portions of the building are appropriated to a chemical and pharmaceutical laboratory, an anatomical theatre, dissecting and operating rooms; all which are distinct and appropriate. It has been well observed that every thing in France is on a large scale, and that there, public institutions combine many parts of science which we keep distinct. Thus veterinary medicine is always considered as an inseparable part of agriculture, and the one is always taught with the other, and which method is likewise pursued throughout the continent; from which one might infer that this bantling of science and art, when it escaped from its union with the manege, found itself unable to stand alone, and therefore sought refuge and support in the tall stems of agriculture. In this way this building is found surrounded by a small farm devoted to experimental agriculture, with a portion allotted to a botanic garden. In conformity with this view, likewise, stallions of various breeds, for the use of the provinces, and Spanish asses for propagating a large race of mules, for the same, are also kept. Bulls, cows, goats, and sheep of curious and exotic breeds, are here also fostered and propagated with extreme method and care.

The course of education, which is rigid and severe, is conducted by seven professors, who lecture daily on some of the following subjects: anatomy, comparative and particular; physiology, pathology, natural history, medical botany, pharmaceutical and operative chemistry, materia medica, surgical operations, veterinary jurisprudence, and the practice of shoeing. Each department sends three pupils, and each cavalry regiment one. When I visited it, there were one hundred and thirty residing within it, each of whom pays a small stipend for board: a college dress is worn, and the conduct of the whole is under the surveillance of a director, who is wholly independent of, and unconnected with, the medical teachers. A residence of three years is required to authorise the practice of veterinary surgery, and of five years to enable the student to act as a veterinary physician. It was at first intended that human medicine should form a portion of the education of each pupil to fit him for practice in the provinces, but which plan was, I think unfortunately for both human and brute medicine, afterwards laid aside. Each pupil takes immediate charge of one patient, and each operates in turn, first on the dead, and then on the living subject. From this outline it will be seen how admirably such an institution is calculated to perfect the ends proposed: nor is this all the stimulus that the students have to cultivate the art. There are numerous prizes offered by government and by agricultural bodies for facts, treatises, or successful exertions, tending to keep alive emulation and foster early endeavours. It is only to be regretted that we can do nothing more than admire this liberal policy; and lament that mistaken economy in the government of our own country, which withholds the means for conducting our veterinary seminary on an equally liberal scale.

The veterinary school of Vienna was established under the late Emperor Joseph. Mr. Sewell, who visited it in 1816, speaks favourably of its arrangement. Prague and Dresden are without veterinary schools.

The veterinary school of Berlin was established by the late Frederic II. Mr. Sewell informs us that it is less extensive than the Paris school, but larger than that at Vienna. It contains a museum and an infirmary, usually filled with patients; it contains also hot and cold baths, an ice house for the application of ice in cases we should not venture to employ it, and a very powerful electrical apparatus. The most celebrated professor of this school was educated at Paris, as I was informed, by Monsieur Huzard, who also remarked that two years' residence authorised the pupils to engage in practice.

The veterinary school of Hanover was established by the present King of that country. It is small, but, according to Mr. Sewell's account, well arranged and conducted.

Of the schools of Italy and of Spain I know nothing; but in both they have celebrated writers on the veterinary art. In Russia, a school has been, I believe, lately established, over which I was invited to preside. Copenhagen has also one.

I have thus brought the history of this art on the continent in a concise manner down to the present period. With the advantages I have noticed, it cannot but have become greatly improved, more particularly in France, where it is cultivated with ardour. The immediate line of practice the French pursue may be gathered from the notices which will appear when treating of diseases; and M. Huzard, who, having visited and examined them all, is peculiarly fitted to judge, informs me that the practice in all the other continental schools is nearly the same as in that of France. In the practice of veterinary surgery and operations, I think, from the inquiries and observations I made, they excel us; but in the department more immediately belonging to the veterinary physician, our neighbours have not to boast of any superiority over us: on the contrary, it is my opinion that they are even behind us. This deficiency perhaps arises from an adherence, on their parts, to the humoral pathology, by which the treatment of internal and acute diseases has continued inert and unsuccessful. Their prescriptions have been filled with decoctions of simples, and they appear unacquainted with the medicinal virtues of the more active remedies in use among us. Still adhering to an opinion that the blood and humours are the seat of disease, they are continually washing them sweet with correctors, entirely unmindful of the derangements of the solids, and of the connexions between living blood and living vessels: but the pathology of Cullen, being now generally adopted not only in France but throughout the Continent, and this having led to an adoption of the improvements of John Hunter, it is reasonable to expect that when by these means the errors of the humoral pathology become banished, improvement will rapidly proceed, and a more active and energetic practice will be resorted to.

Sect. II.

HISTORY OF VETERINARY MEDICINE IN GREAT BRITAIN.

THE veterinary art in this, as in other countries, was long buried in the grossest ignorance; and even the few improvements that did take place were borrowed from our neighbours. During the seventeenth century, manege riding was very prevalent in this kingdom, which we likewise copied from our continental friends, and, consequently, we had German and French riding masters in abundance, who took the direction not only of the actions, but of the health of the animal, into their hands; by which domestic improvement became neglected, and foreign publications alone studied. But as horse-racing and hunting became prevalent, so the manege declined among us. Still the treatment of the diseases of horses remained in the hands of those immediately placed about the persons of the animals; and, as grooms and blacksmiths are usually less enlightened than riding masters, so it was a retrograde step to improvement; and now and then only was there a feeble and individual attempt to rescue this noble art from oblivion, which effort soon ceased to attract attention, and still sooner to excite amendment.

Blundeville, who lived in the reign of Elizabeth, appears to have been one of the first veterinary writers in this country. His work was chiefly a compilation from antient authors, of which he translated several into English. His ideas were fettered with his attachment to the manege, and consequently introduced the errors and absurdities with which that system was then prevalent. Subsequent to him appeared Mascal, Martin, Clifford, Burdon, &c., on whom Bracken published notes. Nearly about this time, also, lived the celebrated Gervase Markham, whose Treatise on Farriery, though strictly empirical and grossly absurd, went through numerous editions, and became the guide and waypost of almost every practitioner. During the reign of James the First, there appeared many other lesser publications, some originals, and some translations from the Italian, German, and French. Among the former, De Grey is more generally known. The next in order, appears to have been the superb work on horsemanship by the Duke of Newcastle, but which had little connexion with the veterinary science. Succeeding this appeared *The Anatomical Treatise on the Horse,* by Snape, farrier to Charles II. His plates are mostly copies from Ruini, and a few of them from Saunier; but not so well executed: his descriptions are likewise taken from these authors; and where he deviated from them he made the human body his guide. In his description of the eye, he mentions nothing of the membrana nictitans, and describes the omentum as reaching to the pelvis, with numerous similar instances: it is said, he projected a larger work on diseases, which he never lived to execute. About this time, an epidemic contagion raged among the black cattle of this country, which produced many publications on the subject; one of which was much read, and is still in many persons hands, by Dr. Layard. In the reign of George I, Sollysel's celebrated work was translated from the French, which had, in some measure, an influence in combating the general errors at that time prevalent; for it was very customary, in some diseases, to tie or bar the veins. In the founder, the legs were tied, that the inflammation might not proceed upwards; which inevitably occasioned mortification, or loss of the hoofs. In affections of the head, the cervical ligament was bored through with a hot iron, and the pole evil frequently produced. A cough raised a supposition that the horse had swallowed feathers, or hen's dung, and he was treated as skilfully as such an ingenious supposition would dictate: this, among grooms, is not yet done away. A stumbling horse had his nose slit. Some diseases were supposed to be occasioned by the bite of shrew mice; and even to this day, among country people, the fern owl, or eve jar, is supposed to inflict a disease on calves as it flies, by striking them, but which disease is occasioned by a species of œstrum, or gad fly. The harmless hedgehog long lay under the obloquy of sucking cows. It is therefore evident, that Sir William Hope's translation of Sollysel must have contributed greatly, among the intelligent, to place these errors in a proper point of view. About the middle of the last century, the art experienced still further improvement by the labours of Mr. Gibson, who was originally a surgeon to a regiment of cavalry; from which situation it is probable he was first led to turn his attention to the diseases of the horse, and by which he was at length enabled to present the best treatise on farriery that had appeared in the English language. It is said, he afterwards lived in Duke Street, Grosvenor Square, where he practised with great reputation. He appears to have written several books; but his principal work is that before alluded to, which was published in quarto with anatomical plates, copied from Snape or Ruini; and called *The Farrier's Guide*: but, though his anatomy was incorrect, and the functions and economy of the animal neglected, yet his treatment of diseases was generally very judicious, and his account of symptoms accurate and interesting: and, as he was guided mostly by his own observation, so he became the best writer and practitioner that this country had then produced.

As a cotemporary with him, lived the celebrated and eccentric Dr. Bracken, who was a physician of great abilities, and extensive knowledge in his profession; a man of considerable erudition, a sportsman, and a wit of a peculiar cast. His works have been as much admired and read for the peculiar style in which they are written, as for the real information they contain.

Though there is great ingenuity in his writings, and though, in some respects, he may be said to have improved upon Gibson, yet, as a practical work, his was much the inferior: nor was his information given in a way that could benefit the generality of his readers. Independent of his style being too peculiar, and his reasoning too abstruse, for farriers; his manner of pursuing his subject was so desultory, that few readers had patience to follow him. Nevertheless his works, which were several, and passed through many editions, have raised him a fame that can only die with the art.

Bartlet, who was a successor to the two former, was likewise a surgeon: he formed himself on the model of Gibson and Bracken, culling all their excellencies, and giving the sum of their treatment in a much more compendious and practical form. Bartlet likewise enriched his works, and benefited the art, by translating La Fosse's improvements and discoveries. But he was principally a copyist and compilator, bringing forward little of his own, except a cruel and absurd alteration in the mode of nicking. It is evident, that Bartlet had not, when he wrote the first editions of his work, seen much veterinary practice; and, throughout the whole, it is apparent he had paid no attention to the anatomy of the animal he treats of; he even fails in attempting the description of the tail, which should have been his particular study. Besides his *Gentleman's Farriery*, he published a *Veterinary Pharmacopœia*. Bartlet's principal help to the art, was the introduction of a much better mode of shoeing, or, at least, of managing the feet, by his translation of La Fosse.

To him succeeded Osmer, who was likewise bred a surgeon, but who afterwards practised the veterinary art in Oxford Street. His *Treatise on the Lamenesses of Horses*, with an improved mode of shoeing, is most deservedly esteemed. His system of shoeing perhaps receives its greatest compliment, when it is known that it is that adopted by Mr. Morecroft, with very trifling alterations. He first commented upon La Fosse's method, and pointed out the excellence of his mode of treating the feet, at the same time shewing that the short shoe was inadequate to the support and protection of the foot in the present improved and hard state of our roads. The practical part of this treatise on lamenesses is likewise excellent; but his reasoning is sometimes defective.

From the above works there were soon many compilations made, which were generally below mediocrity; amongst which, one called the *Farrier's Dictionary*, though a most wretched composition, met with a very rapid sale. I must except from these a small treatise by a Mr. Blount, surgeon, which is above the common class, and worthy of notice from an ingenious contrivance, depicted on a plate, for securing a fractured limb. Mr. Clarke, of Edinburgh, the king's farrier for Scotland, soon after this, gave the world his excellent *Treatise on Shoeing and Diseases of the Feet;* and which was afterwards followed by one on the *Prevention of the Diseases of the Horse*. Nearly at the same time, or very soon after, the public were indebted to Lord Pembroke for his work, which, though professedly written on the management of dragoon horses, contains some excellent observations on shoeing, and the general treatment of the animal. Lord Pembroke derived the principal of his medical hints from Mr. Clarke. About this period appeared the elegant plates of Stubbs on *the Anatomy of the Horse*. Mr. S. was a very eminent horse painter, who, to a high professional excellence in his art, added a very considerable knowledge of the animal frame, particularly of the horse; but Mr. S. appears to have gone too far as a painter, and not far enough as an anatomist. From these periods, till the establishment of the Veterinary College, the attention of the public was occupied by Mr. Taplin. This gentleman likewise began his career as a surgeon, but turned aside to the then more profitable track of farriery. Mr. T. set out by decrying all who had gone before him, and all who were in practice with him; yet his works were compilations from those very authors whom he abuses, and whose errors he perpetuated; consequently, as might have been expected from the late improvements, Mr. Taplin lived long enough to find his writings despised and himself neglected.

HISTORY *of the* VETERINARY COLLEGE.

I now come to a period, from which the principal improvements in this art must be dated, and which will ever remain a memorable epoch to the veterinary amateur: this was the establishment of the *Veterinary College.* We are informed, by Monsieur St. Bel*, in his works, that he was born at Lyons, in France; that he became junior professorial assistant to the royal veterinary college there, but that the commencement of revolutionary principles in France drove him to this country, where he had before been in 1788, and published proposals for instituting a veterinary school, but without success. His second visit, in 1790, was more successful; for, on his again renewing his proposals, they were noticed by the agricultural society of Odiham, in Hampshire. The gentlemen of this society in conjunction with some others, who saw the utility of such a measure, proposed to form an institution, called *The Veterinary College of London,* and to appoint M. St. Bel to the professorship, with whom I was afterwards joined as assistant†.

* I am at a loss to conjecture on what authority the late professor's name is spelt *Sainbel* by some of the writers of the present day. In a letter of his addressed to me, and now lying before me, he distinctly signs himself *St. Bel.*

† Notorious as this residence was, and notorious as was my employment in teaching the principles of anatomy, physiology, and general pathology to the pupils of the then infant establishment; yet the present leaders in the art affect to deny my being a regularly graduated veterinarian, because I never could condescend to solicit a diploma from that very school in which I was a teacher three years before the present professor was elected, and at a time when he had not even turned his thoughts towards the profession. As far as regards my own feelings on the point, I am quite willing to concede it, and I should have been as well pleased even had I never aspired to the honour of veterinary celebrity at all: but that the future members of that body may know in what degree of relationship they may, if they please, consider me as standing towards them as a veterinarian, and likewise that I may preserve some character for consistency with my relatives and friends, who have considered that I degraded myself by relinquishing the profession of human for that of brute medicine, I will, in the face of a

From the first appearance of this institution forming itself into a regular establishment, the number of subscribers daily increased, and, at last, a president, vice-presidents, and di-

probable charge of egotism, offer the following sketch of my professional career.

At fourteen years of age I entered on the customary medical apprenticeship with an eminent practitioner in Buckinghamshire, from whence I removed to the Borough hospitals, where I remained for two years; when from my general acquirements, but particularly from my known attachment to comparative anatomy, I was thought a fit person to be recommended to instruct the pupils of the Veterinary College in anatomy and the art of dissecting, and also to translate and demonstrate the public lectures of M. St. Bel, who had been appointed professor of the infant concern. In this situation I remained about twelve months, when some impolitic attempts of mine to convince the professor that many of his anatomical ideas were incorrect, made him wisely conclude that it would be imprudent to retain one about him who was able to detect his errors (which, as an anatomist, were numerous indeed), and I was in consequence removed from the situation. I had, however, remained long enough to imbibe a strong attachment to veterinary medicine, and, circumstances removing me to Lewes, in Sussex, I there gave a course of public lectures on the anatomy and pathology of the horse, and commenced a course of veterinary practice. It was here I first entered on a series of experiments on the never-ending subject of contracted feet. This situation was also particularly favourable to a study of the diseases of oxen and sheep, which I did not neglect, and in which I was greatly assisted by the liberality of the Sussex farmers, who furnished me with subjects; and it was here I made the discovery of the celebrated Remedy for the Distemper in Dogs. But as the practice of economy was not at that time my fort, my experiments, which were expensive, and my expenditure, which was considerable, so far exceeded my income, that I was under the necessity of relinquishing these pursuits, and of accepting an ensigncy and assistant-surgeoncy in the East Middlesex Militia, where I remained till General Gwynne recommended me to a surgeoncy to one of the troops of horse artillery, then stationed at Woolwich, with which I remained more than two years, extending my knowledge of human medicine by witnessing the judicious management of the Woolwich Artillery Hospital, under the direction of the late ingenious Dr. Rollo. Nor had I less opportunity also for improvement in the veterinary art, from the circumstance of all the sick horses belonging to the establishment being placed under my inspection. It is probable I might have remained here some years longer, but, my relations becoming urgent with me to settle in life, I left the army practice, and settled as a surgeon in the neighbourhood of Queen Square, London: but, although thus engaged, I could not remain forgetful of my former predilections; my leisure time was therefore employed in dissecting, drawing, and arranging materials for a folio edition of the *Anatomy of the Horse*, with coloured plates, which I afterwards brought before the public. But fate at that time seemed to have ordained that I was not to remain long in one situation; for after a twelvemonth spent in this manner, I came into the possession of a considerable fortune by the death of a relative, which induced me to retire into the country. Unfortunately, I had not yet gained a prudential mode of managing money, and, after living expensively as a country gentleman for a few years, I found myself again under the necessity of entering active life. I first accepted a commission in the North Gloucester Regiment of Militia, and passed a campaign in Ireland during the rebellion; but after two years wasted in this manner, prudence dictated that it was doing nothing towards my future welfare; and on the announcement of the expedition to the Helder, I offered my services to the Medical Board, which were accepted, and I was appointed surgeon to the second battalion rectors, were chosen from among the nobility, and other distinguished characters, who felt interested in it. A house was taken at Pancras, and pupils were admitted to board;

of the 40th regiment of infantry, and immediately embarked with them for Holland. As this regiment particularly distinguished itself, and bore the brunt of several actions, my experience in my profession received considerable additions. On our return from Holland, I finally quitted the army, and retired, for a twelvemonth, into Northumberland, where my days were occupied in field sports, and my evenings in arranging the materials for the first edition of this work. But this plan of life also furnishing no prospect of future advancement, I debated what ultimate course it would be most prudent to pursue, when the practice of human medicine naturally stood foremost to my view; but it was unpleasant to reflect that I had lost some years in my start, and that my cotemporaries, from the advantage of early residence and locality, had outstripped me in the race; and that, the market being already overstocked with human surgeons, I had numerous difficulties to overcome, and additional time to waste, before I could hope to get even into tolerable practice. While thus irresolute what course to steer, my former pursuits and writings having gained me some little popularity, I was, as it were, irresistibly, and almost insensibly, drawn into correspondences and practice on the diseases of horses and dogs, which increased, at length, so much as to determine me to devote all my future professional energies to these subjects. In this almost unbeaten track I might hope to reap both fame and emolument; and although it might not appear so honourable a calling as that of human medicine, it was, at least, a very useful one, and, under all the foregoing circumstances, the most prudent one. Actuated by the above motives, I abandoned my wanderings, and maintained a steady perseverance in these pursuits; and from thence has resulted that popular and extensive practice on the diseases of animals in general, so well known in the British metropolis; and from the same source have sprung those several veterinary publications, all of which have passed through several editions, and most of which have been translated into continental languages. From these circumstances, as well as from the testimonials of consideration their author has received, both from abroad and at home, it might be supposed these works deserved some place in the catalogue of useful contributions to the art they profess to treat of: yet in the face of these testimonies, but in accordance with the same spirit which denied me the honour of acknowledgment as a graduated veterinarian, some of the popular writers of the *regular school* have omitted all mention of my productions, even when professing to enumerate and examine all that has appeared on the subject: by which these gentlemen reduce themselves to this dilemma, that either they set their individual opinions in opposition to the almost universal one, or that, from motives which, to say the least of them, look suspicious, they deprive their readers of a notice they profess to furnish them with, and thereby commit a kind of fraud on them. Confident as I am that the VETERINARY OUTLINES will live long under the character of a valuable compendium of the principles and practice of the veterinary art, I should have passed over the circumstance in silence, if it were not for reasons connected with the art itself, and not with myself in particular. I solicit not the honour of their notice: let this and all my other works stand on their own merits, and without merit they certainly would not stand even under the protection of a college diploma, as has been witnessed by the fate of several writers immediately from the school, whose works are sunk into the oblivion they merited.

With those who are the real patrons of the art, I may, I hope, lay claim to some consideration for a course of exertions for its advancement, which has been arduous and unceasing. Of canine medicine, I believe no one will dispute that I am the absolute father; and whether, also, of vetebut, from the difficulty of regulating the concerns, and probably from some domestic disadvantages under which he laboured, the professor did not at first push into effect any active or regular system of instruction. To me, it has ever been a matter of surprise that it was established at all, with M. St. Bel at its head. That he was an ingenious man, and understood the manege, and was indefatigable in promoting the interests of the college, no one will deny; but that by his knowledge of the anatomy and physiology of the horse he was fitted to become veterinary professor, no one of those who most strongly supported him can believe. His writings and his practice bear me out in this opinion; and it must have arisen only from a wish that the college might be established, and from a supposition that no other person then in the kingdom was better able to undertake its management, that his examination, which took place in 1792, by the most eminent medical men of the day, was passed over as satisfactory. Nevertheless, M. St. Bel was possessed of such good natural abilities, and had the welfare of the institution so much at heart, that I make no doubt his deficiencies, had he lived, might have been in a great measure made up by application. In March 1792, it was resolved, that a temporary stabling for fifty horses, and a forge for shoeing, should be built near the house taken for the college. But in August 1793, M. St. Bel was attacked with an illness, which proved fatal in about a fortnight. His remains were interred in the vault of the Savoy chapel, in the Strand, at the expense of the Veterinary College.

M. St. Bel's works were an *Essay on the Geometrical Proportions of Eclipse; Lectures on the Elements of Farriery;* the *Art of Horse Shoeing, and Diseases of the Feet.* And *a volume of posthumous works,* collected for the benefit of Mad. St. Bel. The treatise on the Geometrical Proportions of Eclipse appeared soon after M. St. Bel became known, and paved the way for his future promotion, by gaining him many admirers and patrons. It assumed the elegance of its style from the assistance of the accomplished Mr. Penn: the subject matter itself may be seen, with little alteration, in the first volume of Bourgelat's Elemens d'Hippiatrique, published at Lyons in 1750; where the same tables, and nearly the same proportions, appear. Nor can his Lectures on the Elements of Farriery claim any greater originality; not

rinary medicine in general, I may not be considered as one of its earliest and warmest friends, the above account is best calculated to shew. I have readily pursued its best interests according to the plan I originally proposed to myself; and to which I have adhered so rigidly, that a tempting offer, some years ago, made me to go to India, and a still more tempting and honourable invitation to go to Russia, of later date, both in my professional capacity, failed to move me; and I now reap the fruits of my exertions in a well-earned reputation and a moderate competence.

only the substance, but frequently a literal translation of La Fosse, appears in them, collected from the Dict. d'Hippiatrique.

On the death of M. St. Bel, the public attention was of course engaged in considering on whom the vacant professorship would devolve; and Mr. Morecroft, who was then in private practice as a veterinary surgeon, appeared the most eligible person. Mr. M. was originally a student of human medicine, but he had lately studied veterinary medicine in the French schools, and was universally considered as possessing extensive information on the subject. Mr. Coleman was also a medical pupil of the Borough hospitals, who had distinguished himself by some physiological inquiries, and who had lately, by the advice of his friends, engaged in some experiments on the diseases of the eyes of the horse: but his designs had never, I believe, reached further than this, nor had his attention at that time ever been engaged beyond that point. Between the eligibility of these two gentlemen there could, therefore, be no comparison. The fitness of Mr. Morecroft was, however, so nicely balanced by the interest of Mr. Coleman, that it was determined to unite them in the professorship; and, with the practical knowledge of the one, and the investigations of the other, every thing was to be hoped from the association. But, unfortunately for the institution, Mr. M. soon seceded, and Mr. C. was appointed sole professor. The general establishment now received some important alterations; a handsome theatre for the delivery of lectures, a dissecting room, and a museum room likewise, were erected. A medical committee of assistance was also appointed, consisting of the most distinguished medical practitioners in London: by these gentlemen the pupils were to be examined, and, if found to have acquired a sufficient knowledge of the art, certificates were to be granted them.

It was finally determined, that an annual subscriber of two guineas should have the privilege of sending two horses to the college, to receive medical assistance, the proprietor paying for the keep only. A subscriber of twenty guineas had this advantage made perpetual. Pupils were now admitted to the practice of the institution, which, from the erection of a very extensive infirmary, and the encouragement it had received from the subscribers, had become a considerable field of medical practice. A *regular* course of lectures is now also given throughout the season; private dissections are carried on, in which the pupils have the benefit of the instruction of the professor or his assistant. These advantages are received for twenty guineas, paid by each pupil on his entrance. It should not be omitted in this place to note, that, by the liberality of the distinguished characters who compose the medical committee, the pupils are admitted to their lectures gratis, and this spirited example has been followed by several other professors of human medicine. I should be inexcusable, also, if I proceeded without a tribute to that active promoter of every branch of the healing art, Mr J. Hunter. Veterinarians will ever remember with gratitude how much they were indebted to him for his zealous promotion of this establishment. The country at large, also, has fostered it as a rising plant; in proof of which, the British Parliament has annually voted a sum for its support: and, as an inducement to young men of education and respectability to become students, his late Majesty granted the rank of commissioned officers to such veterinary surgeons as might be appointed to regiments.

Mr. Coleman's professional works, since his succeeding to the college chair, have been, first, a pamphlet *On the Formation and Uses of the Natural Frog of the Horse, with a Description of a Patent Artificial Frog*. Even by the author's friends, this was not considered a fortunate production; and, whatever may be thought of the principles themselves, the application of them has been found impracticable. Mr. Coleman's second veterinary publication, however, whether we consider the importance of the subject, the ability displayed in the anatomical execution of it, or the splendid manner in which it was got up, reflected the greatest credit on him. It was entitled *Observations on the Structure, Economy, and Diseases of the Foot of the Horse, and on the Principles and Practice of Shoeing*, in 2 vols. quarto. (See Shoeing among the Operations.) It was likewise proposed, that a *volume of Transactions* should be published annually; and accordingly, in 1801, the first number appeared, but was not afterwards continued. To the college was appointed, some years past, an assistant professor also, of whom report speaks highly, and of whose exertions for the improvement of the art some very valuable and lasting memento exist.

In the former editions of the Veterinary Outlines, I entered into an examination of the merits and defects of this establishment, but which I now purposely avoid, as a work expressly on the subject is announced. Personalities are apt to creep into such accounts: and those who wish well to the art, however they may lament the defects in a public institution, and however they may regret rumoured schisms among its leaders, will rather pass them over in silence than expose them. The institution, as now managed, has certainly conferred incalculable benefits on the country; and, if it has not yet done all that was expected, extended means and extended experience may remedy the defects.

I shall now proceed with the account of Veterinary Authors.

In 1790, Mr. Prosser, a gentleman engaged in the practice of physic, advertised his intention of practising farriery; and, as a previous step to it, published a *Treatise on the Strangles and Fevers of Horses.* It contains some judicious remarks on other authors, but offers little original matter.

In 1796, appeared a very elegant work in quarto, the production of S. Freeman, Esq., an amateur in the manege, and a gentleman of fortune, learning, and great ingenuity. This publication consisted of a *Description of the Structure and Economy of the Foot;* accompanied with a set of plates highly finished, in Skelton's best style. The subjects were dissected under the inspection of Mr. Home, or an assistant; and, except some slight errors in the ligaments of the navicular bone, appear very correct. This publication, for the elegance of its engravings, and the general spirit of the whole, will be long admired.

A Mr. John Lawrence, also, about this time, published a small volume, containing extracts from M. St. Bel, Osmer, Clarke, and Lord Pembroke. In 1798, this gentleman brought forward a *Philosophical and Practical Treatise on Horses,* and on the Moral Duties of Man towards the Brute Creation, in two volumes. The part of this work on the general treatment of the horse is humane and interesting; but when he attempts to treat on farriery, he may be said to lose sight of his object, and rather to disseminate error than benefit the art.

In 1800, Mr. Morecroft published a small pamphlet, entitled a '*Cursory Account of the various Methods of Shoeing Horses, with incidental Observations.*' The mode of shoeing recommended will be noticed in the course of the work. This year likewise produced a vindication of the present practice of farriers, in a pamphlet by a Mr. Lane. I shall only remark, that if this gentleman was delegated by the body general, they could not have been more unlucky in their champion. It was one thing to retort the abuse cast on them, but it was another to support and vindicate their absurdities.

In 1801, Mr. White, of Exeter, who had been veterinary surgeon to the first regiment of dragoons, gave to the public a small *Vade Mecum of Farriery.* Such was the beginning of a work that has passed through several editions, and is now comprised in four octavo volumes. The first is termed a compendium of the veterinary art. The second comprehends the veterinary materia medica. The third is a sort of supplementary volume, containing Mr. W.'s experiments and observations on some particular diseases, as glanders, farcy, staggers, &c. The fourth comprises observations on the diseases of cows, sheep, swine, and dogs; the mode of performing the most important operations in farriery; with *additional* remarks on the epidemic catarrh, and diseases of the eye. It is greatly to be lamented, that this most valuable work is so totally without order or method, that more than one half of its excellence is hidden or lost. Subjects, that ought to be brought into one point of view, are scattered through the various volumes in detached parts, and only finished in an *appendix*. Mr. White, however, appears to me, in the law term, to have travelled out of the record, when he enters on the diseases of other animals; it otherwise would not have been necessary for this ingenious writer to have submitted to gather from such authorities as John Lawrence and Mr. Daniel. Mr. White's first and third volumes will always remain monuments of his industry and observation. His materia medica would have been more worthy of him, had it treated more largely and more practically of essential articles, and less of others that might have been, indeed, altogether omitted. The detail of operations in the fourth volume entitles him to gratitude from the junior practitioner. In the appendix to this volume, he adds some additional account of the hydrophobia, extracted from the pamphlet of Mr. Gilman. Mr. W., I make no doubt, was totally unaware from what source Mr. G. was enabled to make that *minute* account with which he favoured the public; but if Mr. White will be at the trouble of comparing it with the account of rabies, published by me in the fourth edition of the 'Domestic Treatise on Horses and Dogs,' three years before, he will readily detect the source so glaringly and uncandidly drawn from.

The year 1801, likewise, produced a work of considerable elegance from the pen and pencil of Mr. Richard Lawrence, of Birmingham, veterinary surgeon. It is much to be regretted that a gentleman, who appears to possess so much ingenuity, should pass over subjects of such importance in so light and cursory a manner. The plates are elegant, and extremely well designed, particularly those that regard the proportions and paces of the horse; those which describe the internal structure and diseases are not so happy. It has been since re-edited, and published in an octavo volume, with alterations and improvements.

About this time, also, appeared Mr. Downing's *Description and Treatment of the Diseases of Cattle*. An old writer on the same subject, Topham, appears pretty largely borrowed from by Mr. D. This work is in considerable repute among farmers, graziers, and even some farriers; and it may be regarded as a pretty faithful, though melancholy, picture of this part of the veterinary art, as practised among the greater number of farriers and cowleeches.

1803 produced a large volume quarto, by Mr. John Feron, veterinary surgeon to the 13th dragoons, entitled *A New System of Farriery, &c. &c.* This *new system* appears to be, first, a pretty literal copy of M. St. Bel's proportions of a horse; and, secondly, an indifferent transcript of the college practice. Since which time, Mr. Feron has appeared also in octavo, extending his medical instructions to the treatment of cattle.

About the same time, likewise, was presented to the public Mr. Ryding's *Veterinary Pathology*, in large octavo. This gentleman was also an army veterinarian. It is needless to say more of this production, than that it was usual at this time, with young men from the Veterinary College, to give themselves consequence with their regiment by publishing. But as this was usually done at the commencement, instead of the close, of their practice, so the proposed end was seldom attained.

1805.—If size constituted merit, this year would have been a memorable one for bringing forth a voluminous production in the form of a *Veterinary Dictionary*, from the pen of Mr. Thomas Boardman, veterinary surgeon to the third regiment of dragoons; price £3..3s. This expensive and large work is a compilation from all the modern writers; and, if our author had made his selection with as much judgment as industry, it might have been a meritorious production. As it is, it may prove an useful reference; particularly as it gives fac-similes of most of the plates contained in the various works of merit that have appeared.

This year, also, the indefatigable Mr. John Lawrence published a *General Treatise on Cattle*. The various animals it treats on are principally considered as articles of domestic economy, with a few pages dedicated to their diseases and the treatment. It is altogether a very respectable publication, and may prove entertaining to the amateur, and useful to the farmer and grazier.

In 1806, Mr. Francis Clater, a chemist and druggist, published an octavo volume, entitled *Every Man his own Farrier*. It consisted of the old jargon, a little leavened with the new; the usual number of diseases, and nearly a similar number of never-failing recipes from the old school, somewhat meliorated. And since, with equal claims to merit, has appeared, by the same hand, *Every Man his own Cattle Doctor*.

In 1809, that very ingenious veterinarian, Mr. Bracy Clark, of London, favoured the public with the first part of his *Dissertation on the Foot of the Horse, with Experiments on Shoeing;* and the next year he brought forward the second part of the same: since which time a third part has appeared. The object of this elaborate and elegant work is, by accurately describing the foot of the horse, to enable the reader to comprehend the hurtful effects that the present system of shoeing, even under the best hands, has upon the foot. It is the author's opinion, that the application of an Iron Shoe by means of nails, as now practised, is the *natural* cause of the alteration that is found to take place in the feet of all horses after shoeing, and which alteration it has been usual to attribute to other causes. This opinion will be further examined when we treat on shoeing. Mr. Clark's dissertation is intended to introduce an alteration in the present mode, by bringing forward an invention called the Paratrite, or shoe that may be applied without nails, having instead an elastic steel band embracing the hoof as its means of attachment; the details and figures of which appear in the third part.—Mr. Clark's other works are, *A Treatise on the Casting of Horses*, in which he introduces an improved apparatus, which has, I believe, been still farther simplified and improved by others since. *A Description of the Section of the Horse:* A very accurate figure accompanies this anatomical detail, and the philosophical examination of the general form is highly interesting. *An Essay on the Gripes of Horses*, in which Mr. C. introduces a more active treatment by means of an early administration of pimento, or allspice and spirit. *A Reformed Pharmacopeia*, with a plan of a portable surgery and pharmacy. In this, as in all his other works, Mr. Clark evinces his talent and research; and the art must acknowledge him as one of its brightest ornaments: but whether the classical dress into which he puts even the most trivial matters, does not rather tend to the advancement of his own character as a scholar, than to the improvement of the art among the plain unlettered men who form the majority of veterinary practitioners it is intended to benefit, I leave others to decide.

1814.—This year, Professor Peale, of the Royal Dublin Society, made his *debut* as an author in a work which will long remain as a monument to his industry, zeal, and ability. It is entitled, *Observations, chiefly practical, on some of the more common Diseases of the Horse: together with Remarks on the general Articles of Diet, and the ordinary Stable Management of that Animal.* It would, indeed, be well if a few other of our most popular writers on this subject of the present day would copy after Mr. Peale's plan, and render their works less philosophic and more *practical.* We are most of us too apt to write for a reputation, founded more on our ingenuity or learning than on our practical utility to the art we profess to teach, which, after all, will probably ever remain principally confined among, if not illiterate, at least among men of but moderate learning.

1818.—Mr. Wilkinson published *A Treatise on the Tetanus and Epidemic Catarrh of Horses.* If Mr. W. has not mistaken some other complaints for tetanus, which his clear account of symptoms and references to cases would seem to render unlikely, his treatment of this formidable disease has been very successful, and deserves general adoption. On epidemic catarrh nothing new appears.

1820.—*A New System of Shoeing Horses, with Accounts of the various Modes practised by different Nations; Observations on Diseases of the Feet, &c.* appeared from the pen of Mr. Goodwin, late Veterinary Surgeon to his Majesty. This ingenious writer, to whom the art is indebted for various improvements, has in this work, after a very creditable examination of the causes of lameness, added an interesting account of the horse shoes in use in other countries. His attempts appear to be directed to introduce a modified system of French shoeing, but which shoes are to be forged of *patent malleable cast iron.* The system, to say the least of it, is ingenious, and the work in general highly creditable to the author's ingenuity; but so many difficulties stand in the way, that I question whether this plan will not follow many others that have preceded it.

1823.—In this year appeared the elegant work of Mr. Perceval, Veterinary Surgeon to the Royal Artillery, entitled, *A Series of Elementary Lectures on the Veterinary Art.* If the future volumes maintain the same rank which the present is entitled to, Mr. P. need not blush for his authorship. These lectures are calculated to encourage a philosophical consideration of the subject; and, in point of correctness and language, they vie with the most elegant medical productions of the day.

Minor works have also appeared; among which, I believe, the names of Budd, Powis, and others, appear; from all of which something may be gained, and to all of whom the merit is due of adding their efforts to the common weal.

Sect. III.

OF THE PROPER MEANS FOR THE ATTAINMENT OF THE VETERINARY ART.

THE mode in which any art is attained must be, in a great measure, directed by the future views of the learners. It appears to me, that there are three distinct classes of persons who are likely to study this branch of useful knowledge. The first is composed of persons of fortune, with enlarged minds and extended educations. The second includes surgeons, whose situation in country villages may render their services in this art highly useful, upon occasions when no farrier is at hand, or in cases in which farriers of the common class are unable to judge. The third is formed of farriers themselves, or persons intending to profess veterinary medicine.

Gentlemen and amateurs, who wish to accumulate information on this curious and interesting subject, within the reach of the Veterinary College, will find their account in attending a course of lectures there; if not, I hope they may gain all they want from the following sheets.

A good surgeon has travelled three-fourths of the road towards making a good veterinarian; but he must diligently travel the remainder to arrive at excellence. He must by no means sit down contented with the analogy between the human and brute subject, or he may be led into very great error; for though this analogy is, in some cases, very striking; yet there are others in which the similarity fails, and he is left to act upon different principles. It must likewise be remembered, that the operations of medicines are very different in the one and the other, arising principally from a peculiarity of conformation in the stomach of the horse. This will evince the necessity for a conversance with such anatomical variations from the human structure and functions, as will naturally lead to variation in the practice also between them, of which the feet form a notable instance. The specific diseases, as glanders, farcy, strangles, grease, &c., must also occupy his particular attention; as here all analogy would fail.

The third class of veterinary pupils is composed of farriers already practising, or who intend to practise, this art exclusively. To such persons it must be evident, that entering themselves at the Veterinary College, if within their power, is a matter of great importance. Not only will they derive benefit from the course of instruction there carried on, and from the numerous opportunities of observing diseases in the infirmary of the institution; but those already practising will become habituated to a different mode of considering the art altogether. In fact, a new field will open to their view also.

But when, from circumstances, farriers, or persons intending to practise farriery, cannot possibly attend the Veterinary College, still let them not despair; improvement is yet within their reach: and, provided they will be content to enter on a systematic and regular plan of accumulating information, the acquirement of the art may be made both easy and agreeable. In the first instance, recourse should be had to some of the numerous elementary works on human anatomy, such as those of Fife, Hooper, Shaw, Lizars, &c. &c. By reading these attentively, the memory will become habituated to anatomical language and facts, and the mind will be gradually led to wish to form a further acquaintance with the subject. In the next place, the anatomical detail of the present work should be closely studied, and committed to memory; after which, dissection may be proceeded on: any small animal may be first dissected, to enable the learner to use his instruments properly. He may then proceed to dissect the horse with some authorities by him which will assist him to make out parts; but too scrupulous an attention to numerous descriptions will only bewilder. The necessary instructions for dissection, and the preservation of parts, may be gained by a recourse to Poole's and Parkinson's works, professedly written to instruct the pupil in these particulars. When he is well acquainted with the appearances of the parts in a healthy state, he should take every opportunity of examining the same under disease, which are seldom wanting at the tan-yard or the kennel. He should now make himself acquainted more intimately with physiology, for which purpose he may begin with the light and ingenious publication of Mr. Saumarez, and then proceed with Haller, Cuvier, and finish with Richerand. Pathology, or the doctrine of diseases, may be gained, it is hoped, from the following sheets, assisted by the excellent English authors, both antient and modern, that grace our veterinary bibliotheca. A general acquaintance with human pathology will also greatly assist the veterinarian, for which he may study the popular treatises on this subject, as Hooper, Thomas, Cooper, and others; and his general pursuits may be assisted by a reference to Parkinson's Pupil's Guide.

Sect. IV.

EXTERIOR CONFORMATION OF THE HORSE.

THE horse, in *zoology*, and according to the Linnæan system, is a distinct genus of animals of the order of *belluæ*. The characters of this order are, that the fore-teeth are six in each jaw, the upper, erect and parallel; the lower, more prominent: the canine, or dog-teeth, are single, placed at a distance from the others, and but little longer than the incisive; the hoof is formed of one piece*.

* 'Animale generosum, superbum; fortissimum in currendo, portando, 'trahendo, aptissimum equitando, cursu fureus; sylvis delectatur, posteriora curat, caudâ Canopes Tabanosque abigit; alterum scalpit, pullum 'injuriæ obnoxium reponit; hinnitu socium vocat; dormit post noctem; 'calcitrando pugnat; sudans se volutat; vegetabilia edit bove propius, semina disseminat; stercus incalescit, cystide felleâ caret; non vomit; 'equuleus Hyppomane natus, pedibus elongatis; læditur globulo auris, 'litis, Padi herba, Phellandrii, curculione, conope irritante. Laborat hernia 'mediastini, polypo cordis, ortopnæâ, œstro bovis, nanasali, hæmorrhoidali 'scabie, tartaroque pedum, bubone colli; Hyppocomiâ instruitur. Edit 'impune aconitum. Utero gerit 290 diebus, placenta non fixa. Laniarios 'dentes quinto anno acquirit.'—*Systema Naturæ.*

'Le cheval est sans contredit le plus utile des animaux soumis à l'empire 'de l'homme; nous avons pour premier garand de ses grandes qualités, This noble animal is considered to have been originally a native of what is called the old world, and, by industry, to have been planted in the new*. It also appears the genus exists naturally in greatest perfection in warm climates: nevertheless, care and attention have improved the breed in climes less congenial, to that degree, that the northern horses now greatly surpass, in excellence, the southern; and it is now not uncommon to send stallions from England to improve the breed in those very countries from whence the original stock of excellence is supposed to be drawn. In the arid plains of India the horse is naturally of a moderate size, beautiful, spirited, and very speedy. As he approaches more temperate climes, he enlarges in size, but decreases in beauty: this is, however, compensated by his becoming more hardy, strong, and patient. In countries where pasturage is luxuriant, and the plains extensive, he is found naturally bulky; and from such sources we have been furnished with our grand breed of coach and cart horses, as Belgium, Norway, Sweden, &c. &c. The horses of the British Islands were originally a small, ill-shaped kind, few exceeding fourteen hands and a half in height. In the more mountainous districts, as Wales and Scotland, they were even less; but they were hardy and very sure-footed. Those situated at the most northern points were still smaller, and covered with a great quantity of thick long hair to defend them against the severities of the weather.

At what precise time foreign horses were first brought into Britain is uncertain; but it must have been at a very early one, since history informs us they were sufficiently numerous, and their uses well known, when Julius Cæsar invaded the island. In Henry the Fourth's time the public attention appears to have been particularly directed to the necessity of improving the breed of horses; and some public ordinances were promulgated to that effect. In the reigns of Henry VII and VIII, it became common to import foreign stallions for this purpose from Barbary and Spain. In the next reigns, others were imported from Belgium, Flanders, and Denmark: and as the former were intended to improve the speed, spirit, and beauty, these latter added greatly to the size of the future breeds. As early as the twelfth and thirteenth centuries, there were horse-races in England; but these were probably

'l'estime générale dans laquelle il a toujours été; cette estime a été portée 'anciennement à un degré si haut, qu'on a accordé à un Dieu puissant du Paganisme.'—*Le Parfait Maréchal.*

'Fudit equum magno tellus percussa tridenti.'—*Virgil. Georgic.* lib. i.

* If, however, the fossile bones found at Hatfield Chace, Yorkshire, and in the Isle of Dogs, Middlesex, be really æquine (*Parkinson's Organic Remains*, vol. i, p. 67-95), it would appear that horses were indigenous in England: but Cuvier seems to doubt their characters being genuine.—*Ann. de Museum*, tom. xiv, p. 33.

only ordinary trials of speed between the native animals. In the reign of Henry VIII, horses bred from the Barbary race were trained for the purpose; and it is from this epoch that we may date the principal improvement of the horses of England, till they now not only vie with, but excel, all the horses of the world, both in beauty and qualities.

The *exterior conformation of the horse* is a branch of knowledge that very properly precedes a consideration of his internal structure; and the animal, considered generally, may be divided into head, neck, trunk, and extremities: the different parts comprising each of which, have various terms of art in general use appropriated to them; and it has been found, from long experience, that there is a peculiar form for each of these that is best adapted either to the general purposes of the animal, or to the uses we put him to. Nevertheless, it is not possible to reduce this state of perfection to a geometric scale; hence reducing the horse into a square, and giving various admeasurements for the separate parts as a standard, is not found by experience to exemplify the art: on the contrary, it proves fallacious, and leads into erroneous conclusions*. Nature will not be limited, and the perfection of her operation is not dependant on exterior symmetry only, but on a harmony and accordance of the whole, internal as well as external. In considering a horse exteriorly, his age, his condition, and other circumstances, should be taken into the consideration; and to determine, with precision, to what perfection a horse may attain, when he is seen under various imperfections, is, perhaps, the *ne plus ultra* of a Hippopotamist's knowledge. A horse of five years' old, though considered as full grown, yet experiences very considerable alterations in his form between this age and seven or eight. At these latter periods he becomes what is termed furnished; his points all shew themselves; that is, he is in fact more angular, and, in a painter's eye, would be more picturesque, but less beautiful. A horse, likewise, very low in flesh and condition, is not the same animal as one full of flesh and in condition. And, again, the sleek fatness of full and gross feeding, with little exercise, is utterly unlike the robust form acquired from generous diet with corresponding exertion.

The *head* is a very important part, considered with a view to the beauty of the animal; and in no part is an improvement in the breed so soon detected as in this. Can any thing be conceived more dissimilar than the small inexpressive features attached to the enormous head of a cart horse, compared with the bold striking lines that grace that of the blood horse? It is probable, that the heads of the native horses

* Mr. Clark seems to be of a different opinion; and, consequently, in his *Section of the Horse*, he lays great stress on the uniformity of these proportions, and the advantages resulting from a knowledge of them.

of Britain were all large and heavy till the introduction of the eastern blood. The head, in the improved breed, became small and angular, the eyes prominent, the ears spirited, small, and pointed; the forehead wide, straight, and sometimes slightly curved inwards at the lower part, and in them the facial angle is about 25°, whereas, in the heavy breed, it is more generally 23°; its junction with the neck also is less easy and elegant than in the improved kind.

A superficial observer might, perhaps, overlook the extreme beauty in the head of the horse, and particularly the great fire and expression of his countenance, when animated by any leading passion: and this is to be the more admired, when it is considered how few aids this part has in the brute, compared with the human. Man borrows much of his facial expression from his eyebrows, and, when to these the varied action of the mouth is added, it amounts to more than a half of the total expression. Upon studying the Greek and Roman models, one is led to form but an unfavourable opinion of their horses, from the heavy inelegant heads that are presented to us in their studies and pictures. Either they despised the lighter and more animated breeds from Egypt and India, or their artists too often studied imaginary heads, compounded from the human and brute countenances; and this really appears to be the case, from the sunken eyes, overhanging eyebrows, contracted nostrils, and lips thick and generally wide apart, observed in their statues and pictures.

The *ears* are usually supposed criterions of the spirit of the animal, and I have seldom seen a horse who carried one ear forward, and the other backward, during his exercise, especially if on a journey, but what was lasting and good. The reason appears a plain one: a horse of spirit, strong, and not easily fatigued, is attentive to every thing around him, and directs one ear forward and one ear backward to collect sound from every quarter. I need not mention, that the ears are an indication of the temper of the animal; and that he is seldom either playful or vicious, but the ears are laid flat on the neck. It was kind in Providence to give us such a warning in an animal who does not want craft to surprise us, nor strength to render his resentment terrible.

The *eyes* should be very particularly attended to in an exterior examination of a horse: the globe should be full and prominent, with a thin surface of eyelid. When it is small, or sunk within an orbit surrounded by much adipose or membranous substance, such eye is found more prone to inflammation than the former. It is prudent, however, to guard against too great a convexity of the globe, which now and then does actually exist, and renders the horse shortsighted. The eyes should always be examined in the shade: no better situation can be chosen than that the horse's head should be pointed outwards, but that his eyes remain half a foot within a stable door. The cornea, or transparent part of the eye, should be perfectly clear throughout its whole extent of surface. Sometimes it appears so on a slight inspection, but, more attentively examined, opaque milky lines may be traced crossing its surface. In other cases, nearly the whole may be clear except the extreme limits, which will be found surrounded by an opaque line: when such an appearance exists, it bespeaks the remains of former inflammation, and a great danger of recurrence; though it may be proper to notice, that an accident, such as the stroke of a whip, may leave an opaque speck or line, and that such eye may be no more liable to inflame than though the injury had not taken place; but then very clear evidence ought to be obtained that accident had really occasioned the blemish, and which in such case will seldom be found at the circumference. Not only must this exterior glassy covering of the eye be examined, but the attention should be likewise directed to the deeper parts within the pupil, the appearance of which, in a moderate light, should be perfectly transparent. In a strong light it should exhibit a lively blueishness; but if, in a moderate light, it appears turbid or milky, there is latent mischief, and the examination should now be still more minute: the eye should be viewed in every direction, and it is more than probable that a speck or line of white, more conspicuous than the rest, will appear; in which case a cataract has already began to form (see *Eyes* in *Splanchnology*). In other instances, again, though the parts within the sight may not appear opaque or milky, yet they may exhibit a glassy greenishness, which also is a proof of the existence of a most destructive affection, called, by the farriers, glass eyes; but, properly, *gutta serena*. The existence of this may be proved by observing whether the iris, or the curtain forming the pupil, contracts and dilates; that is, when the hand is placed over a sound eye for a little time, the iris will dilate so as to increase the size of the pupil to admit more rays; but, on the removal of the hand, will again contract and lessen the pupil, to exclude them. A blind horse likewise usually carries his ears as though alarmed, in quick changes of direction, and hangs back on his bridle or halter, lifting his legs up very high; in fact, he presents every indication that a person blindfolded would do. Immediate inflammation of the eyes is known by the appearance of tears running down the face, and by an impatience of light. When the iris, or moving curtain that immediately surrounds the pupil or opening into the eye, is of a lighter colour than brown, such horses are said to be *wall-eyed;* but, however it may detract from beauty, it no farther affects the eye. In some horses, the transparent cornea is small in its circumference, in which case the opaque cornea must necessarily be large, and shew much of the *white* of the eye. It is necessary to distinguish such instances from others, in which, though the opaque or *white* coat shall be of its natural dimensions, yet, from the greater contraction and dilatation of the eyelid, more of it is seen. In the former, it is evident that the *white* of the eye shewing itself in a considerable degree merely from a small superficies of transparent cornea, is the simple form of the organ, and can have nothing to do with the temper: but, in the latter instance, a large appearance of *white* may be received as an indication of a vicious disposition; for extraordinary motions of either the eyes or ears, and which are generally in unison, are consequences of the wants and passions of the animal. If a horse is suspicious, he generally looks out for opportunities to revenge former injuries, or to repel new ones; and the retroverted direction of the eye, in which, of course, much of the *white* is seen, is merely intended to guide the blow he meditates.

The *face* comprehends the part between and below the eyes: when there is much white in it, it is considered as a blemish. If the white extends down the face, it is termed a blaze; and, when continued into the muzzle, it is called blaze and snip. If only a spot of white appears in the forehead, it is called a star, and is esteemed a beauty. If, with a star, white begins below, and is carried downwards, it is called race; and, as has been beforementioned, if it is continued into the muzzle, it is called snip. Thus, when a stolen horse is described, these distinctions become useful; and, in regimental accounts of the marks of horses, they are particularly attended to. Such a particular horse is said to have star, race, and snip white, while another has a blaze only. All the lower part of the head, including the nostrils and lips, is called the *muzzle*. The darker the colour of this part, the more is the horse esteemed. Very dark brown horses are, however, an exception to this, for, in them, the muzzle is generally of a tan colour, which is also prized.

The *lips* themselves should be thin and well supported; when hanging loose and pendulous, they bespeak age, sluggishness, or debility; and it is of more consequence than is usually supposed, that their commissure, or the opening of the mouth, should be of sufficient extent. If too small, it is unfavourable to beauty; but what is worse, it is inconvenient for the well placing the bridle.

The *mouth* itself is a subject of importance, as upon the various appearances of the teeth we form a criterion of the age. The *bars* also are essential to the proper obedience of the horse, and are those ridges in the posterior jaw, between the tush on each side and the grinders. Like the beard, the bars should neither be too fleshy nor too lean, too round nor too sharp. If by a rude hand they have been scarred, the feeling from the bridle can never be true.

Of the Teeth, *as characterising the* Age; *with the* Auxiliary Marks.

A colt is usually foaled with six grinders in each jaw, three on each side. In ten or twelve days he puts out two nippers in front, above and below. In a fortnight after, the two middle ones appear; and in two or three months from this, the corner nippers are pushed out.

From this, till he is a year old, no great changes take place, except that the cavity in the nippers begins slightly to fill up, and appears worn, and the neck of each tooth is particularly distinct. He has likewise now four grinders on each side above and below, three of the milk set, and one permanent.

At a year and a half, the cavity in the nippers is nearly filled up, and he has now three milk and two permanent grinders in each jaw, above and below.

At two years, the mark in the nippers is wholly effaced, and they appear like the same teeth in a horse eight years old: at this time, likewise, the first milk grinder above and below falls.

At about two years and a half old, the two front nippers fall out; and as the permanent ones are some little time coming to perfection, a colt may experience some difficulty in grazing: it might be proper, therefore, at those times, to give him some cut food.

Between the third and fourth year, usually about three and a half, the two next nippers appear above and below, and the second milk grinder disappears about the same time, leaving him now six molar teeth on each side above and below, one colt's, and five of the permanent set.

About four and a half, the two corner nippers fall out, to give place to the last set. The last milk grinder likewise does the same, and soon after the tushes appear. From this time he is no longer called a *colt*, but a *horse:* and if a female, on the falling of the corner nippers, she drops the name of *filly*, and assumes that of *mare.* It is about this time that a horse is supposed to become strong, and capable of enduring some fatigue; and as, till this period, he is objected to for the purposes of utility, so it becomes a matter of study with dealers possessing colts, to make them appear older than they really are. It is, therefore, very common for them in a promising well-grown colt, less than four years old, to draw out the corner milk teeth, on which the horse teeth below appear soon after; the reasons for which we have before explained: they likewise, at the same time, cut the bars to produce the tushes; and when such a colt is docked and nicked, it is not easy to detect the deception: but if to an examination of the usual appearances is added an observance of the grinders, the imposition may be discovered; neither can the animal gain the true appearance of the age they wish, unless the front nippers appear filling, and the corner ones are nearly equal with the rest. The deception is also rendered conspicuous, when this is the case, by the animal not being sufficiently *furnished*, as it is termed; that is, by his not having lost his coltish form, and his muscles not having become swelled and furnished by exercise. A four year old horse is leggy, his forehand is thick and low, his feet are round and very wide at the bottom, his muzzle is round, and his mouth has no depth.

At five and a half, in a natural state, the internal wall of the corner nippers appears on a level with the rest, and the tushes are completely out, and now present a pointed body curved inward, with the outer surface round and smooth, but the inner surface concave and grooved. (See *Plate* II.)

At six years old, in general cases, the black mark or cavity in the two front lower nippers, which was before wearing, now becomes completely effaced.

At seven, the same mark or cavity in the two next, or intermediate teeth of the posterior jaw, likewise is completely worn out, and the tushes appear something blunted.

At eight, the cavity in the lower corner teeth is lost, and now a horse is said to be aged, and to have lost his mark. But the cavities in the upper nippers are found to disappear more slowly; and at eight, when the whole of the others have become effaced, it is common to find only the two front upper ones filled. Two years elapse between the disappearance of each of the next pairs; that is, that as the front upper nippers are found filled up at eight, so the two next are filled at ten, and the two upper corner teeth lose their mark when the animal is twelve. But though the cavity in these teeth disappears in something like the above order, they do not do it with sufficient regularity to be altogether depended upon; nor should a veterinarian ever give a decided opinion from this alone, as he may subject himself to much mortification.

At ten years, therefore, in a great number of instances, the two intermediate upper nippers will be found filled up: the tushes become very blunt, and lose their internal concavity, and the fleshy ridges of the roof of the mouth become leaner.

At twelve, where the disappearance of the upper cavities is regular, those in the corner are effaced, and the tushes are now only a rounded button; the fleshy ridges are still less evident, and the nippers now begin to push forward in an horizontal direction.

When a horse lives to fifteen, his incisive teeth become nearly triangular, and still more horizontal, the upper projecting over the lower, and the upper corner tooth frequently becoming sawed, as it were, into two parts. The teeth now appear yellow, and frequently the grinders become irregular: the eyes likewise sink, and the pits over them look deep. As the animal advances in age, all these appearances strengthen. The nippers flatten at the sides, separate from each other, become furred, and furrows are seen on their surface; grey hair appears over the eyes, the anus projects, while the cellular membrane surrounding becomes absorbed; the lips are also thin and pendant, the lower being often nearly paralytic. But as horses are evidently, for many years after they have lost the *mark*, as it is termed, active, hardy, and fitted for every exertion; so, when a dealer becomes possessed of a horse whose teeth bear more actual marks of age than either his limbs or spirit, it is an object worthy his attention to give them a more youthful appearance. The principal part of this art consists in the operation called *bishopping;* which is the making an artificial cavity in the upper surface of the nippers, by means of a sharp hard tool, and making the cavity permanently black with a heated pointed instrument: but the strokes of the graver detect the imposition, and the two inner grooves of the tushes cannot be restored by similar means; nor can its blunt point be again made sharp and prominent. The tush, therefore, should always be attended to in examining the teeth for a horse's age. It is, indeed, in many respects, a more certain criterion than the nippers, and is, among judges, more attended to.

The judgment formed from the teeth, though general, is liable to error, as some horses living wholly on grain, and early worked, must necessarily wear theirs more than others which feed principally on succulent matter. In cribbiters, and those which champ much on the bit, this variation may be very considerable, and make not less than two years' difference between them and others. A too strict adherence to the teeth marks very frequently leads those who are only moderate judges into very great error, by causing them to reject the most useful and valuable horses without these marks, as being supposed past their work. Nothing is more fallacious than this; the commonly received marks of the age, grant a criterion of not a third of the natural life of the animal; nor of one half of the time in which he is perfectly useful, and fully capable of answering all the purposes for which he was intended: and it is only in a country like our own, where these generous animals are so early put to labour, and so unremittingly forced to pursue it, that this mark is so much attended to. A subordinate attention should be paid to the appearance of the teeth, if a horse appear what is termed fresh and sound; that is, if all his organs be capable of their several functions, the limbs being firm, and exhibiting no appearance of too early, too great, or long continued exertion. The early ruin of English horses is not only to be attributed to the excellence of the roads, by which persons are induced to ride hard; but it is principally to be laid to the account of their being too soon worked, before the maturity of the system is complete, or the motive organs completely evolved. By the premature exertion taking place before parts are well capable of bearing it, early weakness is produced, and nature takes artificial means of strengthening the debilitated organs; hence the cavities between the tendons and their sheaths are destroyed; parts take on a bony structure, whose original formation was cartilaginous, as the lateral cartilages of the feet, and the articular processes of the vertebræ, and a greater quantity of bone is deposited on the surface of some bones than is natural, forming splents, spavins, ring-bones, &c.: and to counteract the unnatural waste, other secretions are likewise preternaturally augmented, producing, in the mucous capsules, windgalls, blood-spavins, &c. But where horses are suffered to attain their full growth, and the complete evolution of their stamina, if they are afterwards put to full exercise, not altogether inordinate, they become competent to the exertions expected of them, and reach old age sound and vigorous. Many good judges will not purchase a horse for hunting earlier than eight years old, and regard him only in his prime at ten or twelve. It is but little considered that the period of a horse's life, with moderate care and good usage, is protracted to twenty-five, thirty-five, and forty-five years: and an instance lately occurred of a horse dying at fifty. The accounts of their being vigorous and strong at thirty, and thirty-five, are very numerous; and nearly as frequent as activity in men of eighty and ninety. A gentleman at Dulwich, near London, has three monuments of three horses, who severally died in his possession at the ages of thirty-five, thirty-seven, and thirty-nine. The oldest, it is to be remarked, was in a carriage the very day he died, strong and vigorous; but was carried off in a few hours by spasmodic colic, to which he was subject. At Chesham, in Buckinghamshire, there was a horse of thirty-six years old, who exhibited no symptoms of debility. nor any external signs of age, but by being nearly covered with warts. It was remarkable, with regard to this four-footed Nestor, that when an unusual hard day's work was required, he was always chosen, as never failing in what was expected from him.

Mr. Culley, in his *Observations on Live Stock*, mentions a horse he knew, which lived to forty-seven years, having during that time a ball in his neck, received in the battle of Preston, in the rebellion of 1715; and which was extracted at his death, which happened in 1758: and, judging him at four years at the time he received the wound (and it is probable he was more), he must, at his death, have been forty-seven.

These, it is true, are not very common instances, but it is not the natural economy of the animal makes them so; but his early application to full exertion, and the unremitting continuance of this, whereby his race is begun frequently before he is three, in the brake, lunge, or riding-house; before five, his utmost speed is exerted after the hounds in winter, and as a hackney against time in the summer; at seven, blind, foundered, and spavined, he gallantly shines in the mail or stage; at eight, he falters in the fish cart; and, before ten, worn out with disease and inanition, his reputed old age gains him an honourable exit at the slaughter-house.

Hence it must be at once evident how small a proportion of a horse's *natural* life is eight years; and yet this is the period that the majority of persons begin to consider him as aged, and unfit for service. The more I see of horses, the more I am astonished at the want of attention and consideration this evinces: my long acquaintance with the animal has induced me to draw the following comparisons between the ages of man and the horse; that is, at these several periods of comparison, the constitution of the man and horse may be considered as in an equal degree of perfection or decay, according as youth or age preponderate. Thus, the first five years of a horse, may be considered as equivalent to the first twenty years of a man; that is, that a horse of five years, may be comparatively considered as old as a man of twenty; a horse of ten years, as a man of forty; a horse of fifteen, as a man of fifty; a horse of twenty, as a man of sixty; of twenty-five, as a man of seventy; of thirty, as a man of eighty; and of thirty-five, as a man of ninety.

Oxen and *sheep* have their ages observed by their horns, which are more conveniently examined, and more certain in their appearances than their teeth. Oxen have a *permanent* and *temporaneous set* of *horns*. Sheep have only the permanent set.

In neat cattle, the age is sufficiently indicated by the general appearance till the third year, when the temporaneous horns fall, and are replaced by a permanent pair. These appear with a kind of button at the end; and as each succeeding year's growth protrudes this knobbed extremity from the head, a circle or ring round the horn is formed; consequently, in these animals, if three years be reckoned for the button at the extremity, and an additional year for every circle, we shall gain the age of the beast; though it is not unusual to scrape or rasp down these rings, to deceive the unwary. In those kine who have no horns, the general appearances are considered, with the whiteness and equality of the teeth, which in the aged are uneven, yellow, and sometimes black. Neat cattle have incisive teeth only in the posterior jaw: there was no necessity for anterior nippers in them, for they gather long grass principally, which they wrap into a tuft with their tongues, and, applying it to the under or posterior jaw, they cut it off with the under teeth. They change their temporaneous set earlier than the horse, beginning at two years to renew the front nippers, and getting a pair every year till they are five years old: thus, they have eight nippers at this time, when they are called *full mouthed.*

Sheep have their age indicated by the horns and teeth. The horns in those who have them, are more usually examined: these do not change, but, as each succeeding year presents a ring, one year is counted for the point, and an additional year for every one of these rings. Where they have no horns, the teeth are attended to. At twelve months, a lamb puts out his new front nippers; and every succeeding year, he gains two more, till he is four years old, when he then has eight in his lower jaw, his upper, like the ox, being deprived of them. The age of *goats* may be ascertained in the same way; and in *deer* it is told by an additional branch appearing to the palm in the antlers or horns.

EXTERIOR CONFORMATION *of the* HORSE.

[Continued from p. 32.]

The *channel,* among horsemen, is the hollow that is formed between the two branches of the posterior jaw; internally it lodges the tongue, more exteriorly are placed glands, vessels, and fat. It should not be too wide, or the head will appear clumsy; but, on the contrary, if it be too narrow, it becomes a still greater defect, both in the riding and the carriage horse; for in this case it will prove painful for the horse to bend his head inwards, or to rein in-to the bridle, either in riding or driving.

The *neck* should form from the head to the withers an elegant but moderate curve: its under surface should be nearly straight. In point of length, it is of consequence that the neck be duly proportioned: if too long, the head will be too weighty. The long neck, likewise, seldom presents a firm or proper resistance against the pressure of the bit. When, on the contrary, the neck is too short, the head is frequently ill placed, and the lever in the hand of the rider will be also too short. Such necks are often likewise weighty, and overloaded with flesh. When the upper surface of the neck is thick and heavy, it is a very strong presumption of a sluggish disposition, particularly in geldings and mares. In stallions, it is a *distinctive sexual* mark, and hence less to be depended on. Now and then, the neck is arched downwards, which is called ewe-necked. When the deformity is considerable, it prevents the head from being carried in its true angle; instead of which, the nose, from being projected upwards and forwards, has occasioned such horses to be called stargazers; to remedy which, it is usual to draw down the head by a martingale. In the horse, and all the grazing tribes, the bulk of the head is in an inverse proportion to the length of the neck, otherwise the muscles would not be able to lift it; and the length of the neck is such, that, added to the angle resulting from the head, the length of both is equal to the height of the shoulders from the ground. It may not also be amiss to mention, that, in the purchase of a horse, it is prudent to observe whether the upper part of the neck bears any marks of a tight collar having been worn. When such an appearance does exist, it commonly arises either from a strap worn to prevent the action of cribbiting, or such a horse is apt to unloose himself, which is almost an equal defect.

The *mane* is that long hair which crowns the neck throughout its whole extent; that part of it immediately in front of the head is called the foretop. Nature appears to have designed this part simply for beauty to the animal: had it been for a guard to the neck, it would have grown on both sides; whereas, when not altered by art, as in dragoon horses, it hangs naturally to one only. In stallions, the mane is generally thick and long: a white one, exhibited some years ago, had it some yards in length, and which was carried in a bag. It is usual, to thin the mane and tail, to wrap a tuft of the hair around the fingers, and pull it out by the roots: but this mode prevents its lying well, and disposes some horses to resist. In my own stable, I have found that the frequent use of a three-pronged angular iron was the best means of keeping the hair thin, and assisting it to lie well*.

The *trunk* comprises various parts, but which, when separated from the limbs, has been by Mr. Clark fancifully but not

* This iron, which was my own invention, may be found among the list of veterinary instruments at the end.

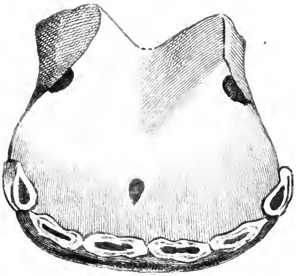
inaptly likened to a boat containing the various organs enclosed by ribs, as in these vessels. This form, as he observes, is admirably adapted by its figure to make its way through the atmosphere. The *withers* are formed from the long transverse processes of the dorsal vertebræ; and as their use is to serve as levers to the powerful lumbar muscles, so their length must be of great advantage; hence, horses with high withers usually go much above the ground; that is, the muscles of the back acting to greater advantage, the fore parts are more elevated during progression; and this may serve to shew that a horse going thus does not depend altogether upon the elevation of either the shoulders or legs, but likewise upon the extent to which his general forehand is raised by the action of the lumbar muscles. Nevertheless, when that is well up, as it is termed, it gives greater capability for the other parts to be moved through a larger space; for a horse, it is evident, can describe a greater portion of a circle in the time of a considerable elevation than in that of a small one; and as his fore legs describe a segment of a small circle, while his withers describe a portion of a larger, and as these may be considered as proportional, so it follows, that the higher the withers are carried, the greater extent there will be for the legs to act in, and a longer time for a higher elevation. But it is evident this applies only to such horses as are wanted for particular purposes: in the cart horse, a weighty forehand is of great service, as he draws by an effort to preserve himself from the tendency to the centre of gravity; so the more he is loaded before, and the nearer he approximates this centre, the more advantageously he applies his powers. Nor is the height of forehand so essential to the race-horse; on the contrary, most animals designed for speed have their foreparts low. There are horses, particularly of foreign breeds, who are remarkable for going high above their ground, though their withers are not high; but this is done in them, from the great strength of the muscles of their haunches and croup, and from the inclination of the hinder extremities, both in the obliquity of their angles and in their increased approach to the common centre of gravity of the whole body.

But the above remarks must not be supposed to detract from the importance of the functions of the shoulders; on the contrary, on their just proportion and proper situation, in a great measure, depend the perfection of the animal progression.

The *shoulders* extend from a little below the withers to the points of the arm in front of the chest, and which points, from this circumstance, are often called the points of the shoulder, when they are in reality wholly formed of the humerus or arm bone (see *o*, Skeleton). The shoulders are too apt to be confounded with the withers, and which confusion between the two leads to great error in justly appreciating the power and operation of those parts. The withers may be high at the same time that the shoulders may be narrow, straight, and altogether badly formed. The shoulders, to be perfect, should be sufficiently muscular to be powerfully acted on, but by no means heavy with extraneous cellular matter. These parts cannot present too large a surface, provided it is swollen by the muscular masses alone, and which may be known by the prominent lines formed by their action; for when we consider the uses of these organs, we shall be at once convinced that immense muscular power is necessary as well for their connections as for their motion; for it is to be observed that the shoulders in the horse are not connected with the body by means of a bony but wholly by a muscular union, he having no clavicle or collar bone. Large muscular masses unite the broad expansive scapula by its upper and inner surface (see *a*, *l*, *k*, fig. 2, p. 6) to the chest, while other powerful muscles below, as it were, suspend the machine between them. By this admirable contrivance elasticity is preserved, which it would not otherwise be; as we know by riding on the croup of a horse, where the union being bony throughout, the motion proves very uneasy. When the body is propelled forward, its tendency to the centre of gravity is counteracted by the fore extremities, which then receive the mass: had the shoulders, therefore, possessed a bony connection, the machine at this time would have experienced a powerful and hurtful shock; but as it is, the strong muscles of these parts receive and sustain what the hind quarters have thrown on them during progression. This connection is not rendered strong by the power of these muscular masses alone, but also by the geometrical situation of the scapulæ or shoulder-blades themselves, which being approximated above, form a kind of partial arch, receiving the trunk within the entrance of its arms; consequently the more force is applied, either by gravity or otherwise, the nearer will these segmental portions be approximated and their strength increased.

The muscular attachments of the shoulder are also favourable to its uses in progression, but strength is not alone sufficient to operate all that is wanted; just proportion and situation are also requisite. The centre of action in the shoulders is within their common centre, and the extent of action of any part moving on its centre is dependent on its length. The motion the shoulder enjoys is confined to the perpendicular backwards, and to as great an elevation as the muscles will admit of forwards; which being commonly the same, it will be at once evident that the more oblique the situation of the shoulder, the greater number of degrees it can run through; and that when it is long and deep, as well as

Colts Teeth.



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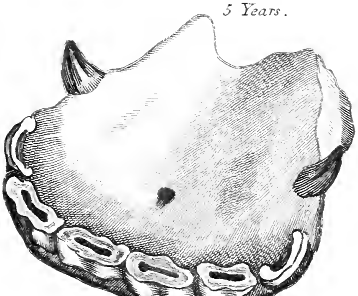

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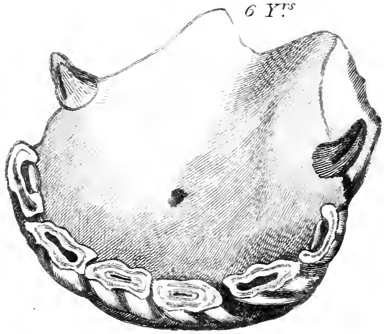

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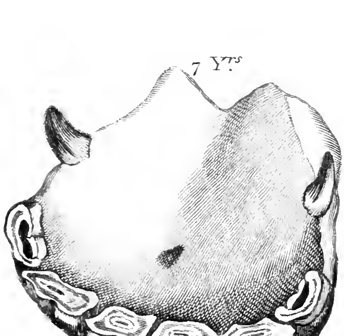

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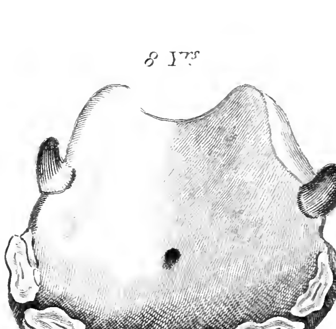

oblique, that this extent will be consequently increased. It is therefore easy to comprehend why breadth and length, but particularly obliquity of shoulders, are favourable to the safety of action by elevating the limb, to the elasticity of it by increasing the spring, and to the celerity of it by enlarging the angle. To the safety of action this form of shoulder is peculiarly favourable; for as the angles formed between the shoulder, the arm, and the fore arm, are consentaneous, and make a kind of bony arch when in action, so an oblique and deep shoulder is generally accompanied with a full bending of the knee. The converse of this form is common with mares, who, from a decreased obliquity in the shoulders, have the angle regulated by an increased obliquity in the whole limb downward; or, as is familiarly expressed, they stand with their legs under them. The immediate reason of which apparent defect is, that, by such a position of their fore extremities, the pelvis is raised higher, and the foal thereby becomes more conveniently placed, and less likely to be ejected. Few rules can be laid down for observance in the exterior conformation of the horse, that are of so general application, as that a short and upright shoulder, particularly if united, as is usually the case, with an inclined direction of the whole limb backward, is a sure mark of an unsafe pacer, and commonly, though not so universally, of a slow one also (and which fault the English horses are taxed with too much truth, as being common among them); for it is to be observed that the fore limbs in general, and consequently the shoulders, as a part of them, are less concerned in propelling the machine forwards than the hinder ones, their principal office appearing to be the support of that portion of the machine which they receive, which is, perhaps, two thirds of the whole; for instead of being considered as placed at the extremity of the trunk, they should, in consequence of the weight of the head and neck, and the dip or inclination of the trunk between the fore legs, be regarded as but little inclined from its centre. Thus the fore limbs present a perpendicular form which adapts them to sustain this weight, but which perpendicular, it is to be remarked, is not so perfect as to deprive the limb of elasticity; for downwards it is broken by the angle of the limb below the pastern, and still more inferiorly the elasticity is increased by an apparatus admirably fitted to fulfil this end, in numerous elastic attachments connecting the superincumbent weight to a hard box formed to resist the impressions received by the ground; as we shall have occasion more fully to shew hereafter. Upward the perpendicular is broken by the angle presented between the arm and shoulder. But this reasoning must not lead us to suppose that the fore limbs are not more or less concerned in progression; on the contrary, the shoulder particularly is materially concerned in it, and perhaps

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in a greater degree in the slower paces of the short gallop, the trot, and the walk.

The part between the points of the arms or shoulders is called the *breast* or counter. Its form should be regulated by variety in the animal. In the saddle horse, it should be only moderately wide and extended; when very confined, the lungs have not sufficient room for expansion, or otherwise they must press backwards and interfere with the stomach; and we do actually find that narrow-chested horses have seldom a good digestion, and consequently are seldom durable. The shoulders likewise are not sufficiently muscular, and the approximation of the limbs is unfavourable to stability: but on the contrary, when the breast is too wide, particularly when it projects and hangs over, such a horse must be weighty, and consequently unsafe in his mode of going. This form however, for these reasons, is peculiarly favourable to the draught horse, particularly for those employed to move heavy loads.

Opposed to the arm point is the *elbow;* the width of which part, and that it forms a considerable angle with the arm, are matters of importance in progression; for as it becomes a lever for the extensor muscles of the fore arm, so its length must make all the difference in power between a long and a short purchase. The elbow should also stand on a level with the arm, laterally; when it is turned inward, it confines the action considerably; when it is too much turned outwards, the toes are often turned inward. The space between the point of the shoulder and the elbow, is, properly, the arm; though it is not usually, among horsemen, considered as such; originating from a want of consideration of the internal structure. This part should be placed in the line backwards, as the shoulder is forwards, and the more acute the angle between them the better; for the greater will be the extent and strength of the motion described by the opening of this angle. The *fore arm,* usually called the arm, should be large, wide, and muscular; for in every instance a small fore arm is a certain indication of weakness. All animals intended for quick motion have this part long likewise; the knee of the greyhound is but three or four inches from the ground; but though this part should be long for quick progression, it is not found equally eligible for the cadences of the manege, and hence horses of this description are chosen with a short fore arm.

The joint immediately below this, which forms the wrist of the human, is, in the horse, termed the *knee.* This, like the other of the joints, ought to be broad and extended, whereby the surface of muscular and ligamentous contact is increased, and the stability, in proportion, augmented; and by this form it also removes the tendinous insertions farther from the centre of motion, thereby increasing their power. The knee should be examined to see whether the skin has been broken by falls, and great caution is necessary in this, for the hair sometimes grows so well over it, as to leave the scar hardly discernible; frequently, also, the dealers use some colouring matter, whereby the part is rendered black: but it does not follow that a mark or scar always indicates a stumbler; and persons are too apt to forget, that the best horse may have an accident and fall, which will never influence his future manner of going, unless the cicatrix should be of such extent as to interfere with the motion of the joint: if, therefore, the arm and fore arm be strong, the forehand high, and the horse shew good action, he should not be rejected wholly for an accidental blemish.

The *canon* or *shank* is the part below the knee, and it is highly requisite this part should be well formed, that is, thin and broad; for as it is purely bony and tendinous, so any increase in size laterally must only arise from cellular substance, or accidental swelling, which will interfere with the motion without adding to the strength. There is within the knee, and at the superior part of the canon, a bone of the carpus purposely set out at a distance from the rest (see **1, 1**, *fig.* of Skeleton), for the insertion of a muscle, and likewise for the supporting of ligaments that bind down the tendons or back sinews: when this is prominent, the muscles which bend the parts below are situated more advantageously for action, and the flexor tendons are likewise not bound too closely; but being removed considerably from the centre of their motion, their powers are much increased: and this is so certain, that a horse *tied in* under the knee, as it is called, is never found to be able to bear exertion long; he soon becomes strained, and the legs get bowed or arched, and totter on the slightest exertion. Dealers frequently assert that such a horse was foaled so: it is true the colt was born badly formed, but the effects come on afterwards. This also may be considered as a rule admitting of few exceptions; that hardly one horse in fifty reaches eight years old with straight legs and sound pasterns, who is *tied in,* or narrow in this part. The large powerful tendons supporting and moving the parts below the knee, are called, by horsemen, the back sinews. It is necessary, for the above reasons, that they should be set out wide from the bone, not only at the knee, but continued down so, making a broad wide surface laterally: they should also be large and firm. In blood horses this form is particularly observed; on the contrary, in the cart horse the back sinews are seldom proportionally so large, and more seldom so well placed. These tendons should be distinct and clear from the knee to the fetlock; when any thickening is observed, some injury has been received. If the swelling appears nearer to the bone than the tendon, particularly if on the inner side, it betokens a *splent*. If a splent be situated not far from the knee, and be evidently distinct from the tendons, it frequently occasions no future inconvenience; but when a splent appears to extend itself inwards and backwards among the back sinews, it irritates these parts, occasions inflammation, and ends in an enlarged callous swelling. When the whole tendon is swelled, and rounded, as it were, into one mass with the bone, leaving no distinctive marks between the one and the other, still greater mischief, probably, has at some time happened. Either some of the ligaments have become ruptured; or such a relaxation has taken place from strain, as will always keep the limb weak. To detect lesser enlargements of the tendons and ligaments, the eye alone should not be trusted, particularly in hairy-legged horses; but the hand should be deliberately passed down the shank before and behind. The inner and under surface of the knee should also be examined in purchasing a horse. If an enlargement or a scar appear, it arises from the *speedy cut*, so called from its being a blow given to the part by the foot of the opposite side when the horse is trotting fast. A sore scabby eruption within the bend of the knee sometimes exists, particularly in cart, or low bred fleshy horses. These eruptive appearances are called *mallenders*, and render the horse very objectionable, as they prove frequently obstinate against healing, and always bespeak a bad habit.

The next part below the canon or shank is the *pastern* or *fetlock*. General usage, however, applies the term fetlock to the joint itself, and pastern to the phalange or part proceeding from the fetlock to the foot: properly speaking, the fetlock is only the posterior part of the joint of the pastern, from which grows the footlock of hair. It is of great consequence in the exterior conformation, that this part should be duly proportioned. When the pastern is very short and upright, the limb is deprived of much of its elasticity, and such horses prove uneasy movers: they are also unsafe; for the pastern being so nearly in an upright position, requires but a small resistance, or slight shock, to bring it forwards beyond the perpendicular, in which case the weight of the machine increases the prone tendency, and the animal falls. Nor are these the only evils occasioned: this formation tends also to an early wearing out of the legs; for the ends of the bones being opposed to each other in nearly a straight line, receive such a jar or shock at each progressive movement, as gradually deranges the part, producing an overshot joint, absorption of the cartilages, and thickening of the ligaments. When, on the contrary, the pasterns are too long, they are frequently too oblique, and must then be also proportionally weak; though, from the increased elasticity occasioned by this formation, such horses are commonly pleasant and easy in their paces.

These joints, both before and behind, are subject to what are very erroneously termed *windgalls;* but which are nothing more than a diseased enlargement of the mucous capsules, or bags, placed towards the bottom of the shank, between the bone and back sinew, for the purpose of lubricating the joint. Their existence is detected by the appearance in this part of a puffy elastic swelling of greater or less size, and commonly existing, one on the inner and one on the outer side of the joint. The swelling itself is not detrimental, unless it be very large; but its existence shews that the limb has suffered an extraordinary degree of exertion, the inflammation brought on by which has so increased these otherwise natural and necessary parts. The inner part of the fore and hind fetlock is also subject to the accident called *cutting,* which is nothing more than a blow given either by the hoof or the shoe, when, in its elevation, it passes the opposite fetlock. A cutting horse, who lifts his legs very high, does not touch the fetlock; but, as we have before noticed, he strikes the canon immediately under the knee. Cutting in the fetlocks is often a defect in the form of the limbs, as when they stand too near together, or when the feet turn either inwards or outwards. It is also frequently brought on by weakness; hence lean, jaded, and tired horses, will do it at times, who, under other circumstances, will go free and not interfere. For the same reasons, many horses cut before they become strong and furnish, that never cut afterwards.

The *feet* are next to be considered, and, in the examination of a horse, too much attention cannot be paid to them. We shall here point out what is immediately necessary to our present purpose: much more may be seen relative to their structure, when treating on the anatomy of the part. The feet are more liable to be found too small than too large; though, in horses bred in low marshy situations, as Lincolnshire and Cambridgeshire, the hoofs are often naturally of a larger size than ordinary; and, however convenient this may prove to the animal while moving on the quaggy surface of these marshy districts, they are very unfit for speedy and light movements in more dry situations. Such horses go heavily, and stumble; and as the horn, of which these enormous feet are formed, is always weak, so, by use on hard roads, the anterior or front part falls in, and the sole, or under part, projects outward, reducing this part, at last, from a concave to a convex surface: such feet are then called *pumiced.*

Horses are, in general, born with their feet perfect; but some breeds are more liable to the grand and frequent evil of *contraction* than others: it is peculiarly the case with blood horses. Colour, also, seems to have some influence in contracting the feet; hence I have observed dark chesnuts particularly prone to it. A good foot should exhibit a proper line of obliquity: when the horn is very upright, however wide and open the heels, such feet soon become defective. This is but seldom attended to, even among those who esteem themselves judges: but no rule admits of fewer exceptions, than that such a foot soon becomes faulty. There should also be a proper height of horn: when too high, it disposes to contraction; when too low, the heels, quarters, and soles, are all weak, and a tenderness in going must be experienced. But, above all, the heels should be attended to; they should be wide, and the frog healthy, firm, yet pliable and elastic. There is a peculiar state of disease, not mentioned in authors, or rather it is the beginning of a disease, in which there is a diminished secretion of horn. It shews itself not by any contraction of the heels; on the contrary, they are in general fuller than natural, are rounded upwards, and are particularly soft to the feel and shining to the eye: in such cases the frog also is large and softer than natural. *Contraction* of the feet is their most general evil, and it begins generally at the heels; when therefore the heels are narrower than the quarters, particularly if the quarters are indented under the coronet, all is not right. Such a foot will probably feel hotter than natural; the frog also will be compressed and small, and very likely thrushy. *Thrushes* are always strong objections to a horse; for when they exist in an open foot, that foot will not long remain so, if they are not stopped; and, as some horses have a strong natural tendency to thrushes, so their existence is always suspicious, and deteriorates much from the value of the animal. Nevertheless, when it can be ascertained with certainty that they are not of long standing; when the matter only exudes from the middle cleft of the frog, and not from any lateral sinuses, and neither the form nor firmness of the frog being altered; and also when circumstances can be learned that prove the horse has been placed in such situations as favour the approach of thrushes, as moist litter, or long confinement; then such a horse need not be rejected, for these thrushes may be permanently healed. But when the complaint accompanies a foot already smaller than natural, when the heels are, as it is termed, wired and drawn in, the frog rotten and pinched, and the whole circumference of the hoof perhaps encircled with rings; reject such a horse, let him go as he will, for he cannot long remain sound. When a horse's foot is held up, the sole should present a concave surface; if it be less concave than natural, that sole is weak, and will not bear much pressure; and it is more than probable it will continue lessening in concavity until it becomes a plane, when every subsequent shoeing will endanger the laming of the animal. *White feet* are very objectionable on this account, for they are particularly liable to become flat in the sole;

their quarters, also, are commonly weak, and fall in; and when neither of these evils take place, they yet have seldom strength enough to resist contraction: and it may be determined on, that, when there are three dark, and one white foot, in nineteen instances out of twenty, the white foot becomes defective sooner than the dark ones. *Corns* are another evil to which horses' feet are very liable; and, unless the shoes are removed during the examination, it is not easy to detect them: though, when the foot is well picked out, if a corn has been of long standing, some marks of former cuttings out will appear under the heel of the shoe. Another very serious complaint is a brittleness of hoof; but which may be generally detected by the marks of the fragile parts detaching themselves from every old nail hole. This kind of foot, particularly in hot weather, breaks away, till there is no room for the nails to hold; when the horse, of course, becomes useless.

In an examination of the foot, the eye should also be directed to the wearing of the shoe: if it be unequally worn, particularly if the toe be worn down, such a horse is probably a stumbler, and cannot step true, either from defective feet, or natural gait. In the circumference of the walls of the hoof, sometimes cracks are observed: when these are longitudinal and deep, they are called *sand cracks*. Any such crack should be well examined, and if it occurs in a hoof apparently contracted, it ought more closely to occupy the attention. In fact, unless very strong reasons operate to the contrary, any crack at all resembling a sand crack should cause such horse to be peremptorily rejected. This evil having once occurred, is very liable again to return.

On a review of the conformation of the fore extremities, it may be remarked, that though the hinder ones appear to be more particularly concerned in the quickness of the progression; yet, that upon a proper form and a true direction of the various component parts of the fore limbs must depend the stability, the truth, and the safety of the movements. Viewed anteriorly, the legs should stand rather widest at the upper part, inclining a little inwards as they proceed downwards. Viewed laterally, it is of the utmost importance that the fore legs should stand in a direct line downwards, neither forwards nor backwards; the toe should naturally place itself under the point of the arm or shoulder. If the foot should stand beyond this, which is seldom the case, the action will be confined, as the limb will have already passed over a part of its ground. Such a horse, however, generally treads flat, even, and safe. When the foot stands behind the direct line, the defect is more considerable; for, inasmuch as it removes the centre of gravity too much forward, so it inclines the animal to fall; and as it is, in general, the consequence of a want of extent and obliquity in the shoulder, so it lessens the speed; unless, as has been before said, the hinder extremities should be particularly strong, in which case, though the speed may not be materially affected, yet still the safety of the action may. Some of the best runners this country ever produced, have been very defective in the formation of their fore limbs. Eclipse was a strong instance; but in him, as well as in all the others, there existed a very particular degree of perfection in the hinder ones. To be speedy, therefore, it would appear to be absolutely necessary that the hind quarters should be strong and well placed. To have truth, ease, and safety, in progression, it is also as absolutely necessary that the fore quarters should have strength and perfection of form.

Having finished the fore extremities, we shall now proceed with the body; and first, with that part usually called the *carcase*, which consists of the ribs, the belly, and flank. Anteriorly, the *ribs* should be wide upwards, and as much deepened below as possible, affording what is popularly termed great depth in the girth. This form is of great consequence, as it increases the surface of attachment of muscles, and very materially assists respiration. Posteriorly, the ribs should form the body as much as possible into a circular figure, that being of all others the most extended, and the best surface for absorption; thus *barrelled* horses are, as they are called, greatly preferred. When the chest is too straight and flat, the *belly* is also small; hence neither can the blood absorb its vital principle from the air, nor the lacteals the chyliferous juice from the intestines in sufficient quantities; therefore these horses are weak and seldom durable. As less nutriment is taken up by the constitution, so less is eaten; thus also they seldom are good feeders; and as the pressure on the intestines must be considerable from the small containing surface, so are they usually what is termed washy, that is, easily purged, whereby an additional cause of weakness exists, from the too early passing off of the food. Nevertheless, it must be remarked, that these sort of horses sometimes prove better workers than one would expect, and are commonly spirited and lively. A knowledge of the advantages gained by size in the belly, is what constituted Mr. Bakewell's grand secret in the breeding of cattle; he always bred from such as would be most likely to produce this form, well knowing no other would fatten so advantageously.

The *back*. Where the withers end, the back begins. It should not be too long, for a cylinder of a certain length will not be so strong as one of a less length, nor can it bear so much; hence long-backed horses are easy, because the action and re-action are considerable, and thus resemble a spring;

but what they gain in ease they lose in strength; both ligaments and muscles are longer, and hence act to greater disadvantage. When the back is too short, such horses, by having their extremities too much approximated, usually overreach. The back may be curved inwards or outwards; when inwards, it is termed hollow, or *saddle-backed*, and which formation is not favourable to strength; but as the counterpoise is kept up by other curves, so the crest is generally good: such horses ride pleasantly, and commonly carry considerable carcase; sometimes, indeed, too much. But when the curve is outwards, the horse is said to be *roach-backed*, which prevents liberty in his action, renders him uneasy in his paces, and, from the approximation of his hinder extremities, he will commonly overreach. To counteract, also, the curve of the back, in these cases, not only are the hinder extremities drawn under the animal, but the head, for the same reason, is also carried low. A short backed horse is in considerable request with many persons; but when the back is too short, there is seldom great speed, for the hind legs cannot be brought sufficiently under the body to propel the mass forwards: the points, likewise, between the ilium and the lower angle of the femur approach too much, and in their flexion press too much on the abdominal viscera to allow of free motion.

The *loins* occupy the attention of all good judges in their consideration of a horse; the back extends to the posterior part of a common sized saddle, and where the back ends, the loins begin. Sometimes, from a defect in the sacral processes of the vertebræ, this junction of back and loins presents an indentation, as though the union was incomplete. This may be considered, in some degree, as a defect, inasmuch as it deprives the part of muscular attachment, and such horses are said to be badly loined. The strength of the loins depends on the extent of the transverse processes of the lumbar vertebræ, which should be long, that there may be an extensive surface for the attachment of the muscles of the back; and these muscles should also be large and prominent on each side, giving width to the loins, and seeming by their enlargement, as it were, to swallow the back bone. When the protuberances of the ilium are very prominent, the horse is called ragged hipped, which operates disadvantageously only in appearance. From the loins to the setting on of the tail, the line should be long and very slightly rounded; by which means also, the distance between the hip and the point of the buttock will be considerable. This formation is peculiar to the improved or blood breed, and in every point of view appears the most perfect; for it affords a very increased surface for the attachment of the powerful muscles of these parts. And though the large buttocks of the cart horse would at first sight bespeak superior strength; yet, when he comes to be viewed attentively, it will be found that the early rounding of the sacral line or croup, the low setting on of the tail, and the small space between the hip and buttock, produce a decreased extent of surface, compared with the broad croup, wide haunches, and deep spread thighs of the blood horse.

The *flank* is the space between the ribs and the haunches: this part should not be too extensive, or it indicates weakness in the loins, and too great length in the back. When it is hollow, it shews shortness in the transverse processes of the lumbar vertebræ, and hence a want of room for the attachment of the large muscles of the loins. When the flank rises and falls in respiration quicker than ordinary, particularly if the horse be at rest, it betokens either present fever, or defective lungs. Should it arise from present fever, other symptoms will also be present, as heat, dulness, and disinclination to feed: but when the horse appears otherwise in health, and yet heaves at the flanks more than natural, particularly if the weather be moderate, and the stable not hot; it is probable that such a horse is thick winded. If the inspiration of the air appear to be performed readily, but the expiration with difficulty, and the flank, in expelling it, fall with double quickness, and as it were at two efforts, such a horse is broken winded; and his cough, which should then be tried, will probably be found hollow and sonorous. If no quickness in respiration appear, but on trotting or galloping a wheezing noise be heard, it is called roaring; and though it constitute no present disease, yet it is the remains of a former affection, and it even now interferes with speedy action, and, in law, it renders a horse unsound and returnable.

As the fore extremities may be considered as especially designed to receive and sustain the weight of the machine, and to resist the momentum of progression thrown on them, so the hinder extremities may be regarded as the essential propelling organs: having themselves less to support, they are flexed into considerable angles, and which angles are operated on by masses of muscles of immense power. It is also a curious but wise provision in the mechanism of the motive machine, that the upper angles of the fore and hind limbs should be reversed; for, while the scapula, or shoulder blade, is inclined backward, the ilium, or haunch bone, inclines forward: the inclinations of the humerus or arm, and of the femur or thigh, is equally reversed; and, in a slighter degree, the same is observable in the corresponding bones immediately below, by which admirable arrangement the trunk is suspended in equilibrio, instead of falling backward or forward as might have happened, had all the angles been consentaneous. A view of the skeleton will clearly prove this.

That the hinder extremities are very principally concerned in progression, at least as far as regards speed, is again evident from the attention that Nature pays to make them particularly strong, and well formed, in the most perfect of the specimens she has favoured us with: for let an animal destined for speed be ever so lightly framed in other respects, yet great power will be always displayed in the hinder parts. Thus, in blood horses, which are derived from the eastern or most perfect breed we are acquainted with, not only are the loins wide, and the croup long; but, viewed from behind, these horses will be found wider in the thighs than even in the hips: and of all the distinctive marks between the high bred and the low bred horse, this is the most striking and characteristic. A good judge, under every disadvantage, immediately discovers a portion of breeding by this appearance of extent and power in the muscles of the thigh alone.

The real *thigh* of the horse is so concealed by muscles, as not generally to be known by that name; but a view of the skeleton will readily enable the reader to acknowledge its designation. It will be found, as has been noticed, reversed in its angle of inclination from the humerus, or real arm, to which it corresponds, being articulated above at about the same level, but descending downward considerably lower with a greater inclination. It can also pass considerably beyond the perpendicular backwards in its range of action, which form and situation more strongly point out the immediate importance of this part, and the superior part that the hinder limbs take in propelling the body forwards. It is evident from what has been said, that its being plentifully furnished with muscle is essentially necessary to the perfection of its form.

The *whirl bone,* among jockies, is the articulation of the thigh-bone with the pelvis, and is a very strong joint rarely dislocated, but its ligaments are frequently extended, when the horse is said to be lame in the whirl bone or hip joint: and as the powers of renovation are small in these parts, so the lameness is usually long, and the muscles waste.

The *stifle* is the part that approaches the flanks in action, and corresponds to the knee of the human; consequently the part below it ought to be called the leg, but it is usually known by the name of the *thigh,* or gascoin. For the reasons before mentioned, it should be strong and muscular; it should, likewise, make a considerable angle with the femur or thigh, forming a direct line under the hip or haunch. Its length, as is seen in all animals destined for much speed, should be considerable; and all that part below the stifle to the hock, which is called improperly the thigh, should be very large and strong; whenever it is thin, and but indifferently furnished with muscles, it bespeaks weakness.

The *hock* forms the joint between the thigh, commonly so called, and the canon; it may be considered as the most complex and important joint of the body: its form should be broad and wide; for, in proportion as the calcaneum, which is the bony process that forms the real heel, and is called the point of the hock, extends itself beyond the other bones, thereby increasing the breadth of the joint; so the tendons inserted into it act with a longer lever, and thus with a great increase of power. This joint is subject to several diseases, prejudicial in different degrees, and therefore requiring different degrees of attention. When, on inspecting the hock, a soft puffy swelling is discovered within the ply or bend, it is termed a *blood spavin;* but which is, in fact, nothing more than a windgall, or enlargement of the mucous capsules of the joint, which lie under the vein of this part. What was said of windgalls in the fore legs applies also to these. The mucous capsules on each side of the hock also, at times, become enlarged, and are then called *thoroughpin.* At the back part, likewise, of the joint, the ligaments become sometimes strained and inflamed; and the shank, instead of exhibiting a straight line from the point of the hock downwards, presents in this case a curved surface, accompanied with heat and tenderness, which is then called a *curb,* and usually produces lameness. The inner part of the joint at the bend is subject also to a similar scabby eruption to that of the fore legs, and which, in the hinder ones, is called *sellenders.* But the most serious disease to which the hock is liable, arises from an inflammation of the ligaments of the tarsal bones, and, at last, of the bones themselves, generally of the inner side: this disease receives the name of *spavin,* or bone spavin. To detect the existence of this affection, the hocks should be attentively viewed from behind, when any enlargement in the spavin place may be easily detected. In fact, the importance of this joint renders a very minute examination of it essential in every point of view in the purchase of a horse.

In the consideration of the parts below, what has been said of the fore extremities applies equally to the hinder.

COLOUR *of* HORSES.

THE *colour* of horses does not depend on their real skin, as with us, but upon an exterior beautiful covering which Nature has kindly given them, called hair. Nevertheless, the hair is, in some measure, influenced by the skin, as light skinned horses have light hair, and where there is white hair there are usually light eyes. As this hair presents very considerable varieties in its tints, so horses are said to be of various colours. Buffon has classed these into simple colours extending all over the body; into compound, being those mixed with others; and into strange and extraordinary colours. The *simple colours* are the white, the dun, the sorrel, the bay, and the black. The *compound* are the grey, the mouse, the roan, and red roan. The *extraordinary* are the tiger, the piebald, the strawberry, and the flea-bitten. Buffon seems to think that bay is the natural colour of European horses, and that, in a complete state of nature, all would be bay; but this has been supposed rather fanciful, though it is probable much might be urged in its favour. The bay has different shades; and hence forms the bright bay, the dark bay, the dappled bay, and the light and dark chesnut. The brown bay is a large mixture of black, and is usually esteemed excellent. The dark bays have commonly black manes and tails, and likewise black legs and hoofs, and are very justly preferred. The light chesnuts are considered weak; many of them are, however, very excellent: the Suffolk punches, a most valuable set of draught horses, are of this colour.

The dark chesnuts are fiery in their dispositions, and, I think, particularly subject to contracted feet.

The black, which is not an esteemed colour among us, admits of different shades. Black horses present all the characters, from the most fiery and impatient to the most sluggish and dull. Many persons affirm, that there are more bad black horses than of any other colour, and I am very much of the same opinion.

The dun is a colour that has several varieties; it is sometimes accompanied with a white tail and mane, at others with one darker than the rest of the hair; in some there is a list extending down the back, which is sometimes seen in the bay also.

The sorrel is a species of the chesnut of a lighter red; and this likewise admits of varieties.

Of the compound Colours.

The roan is a mixture of red and white; and gives the common roan, the red roan, and the dark roan.

Grey horses admit of several shades, or different proportions of white and black, as dappled grey, silver grey, and iron grey. These horses are much valued on account of their beauty; sometimes a slight tint of bay, mixed with the white and black, forms a variety in the grey. Grey horses, like the black, admit of no settled character, but have all the extremes within their range; nevertheless the darker greys are preferred.

Pied horses form the most frequent among those called extraordinary; they consist usually of white and some other colour, placed in different parts distinct from each other, as white and bay, white and chesnut, and white and black. The flea-bitten is a grey or white horse with small bay spots intermixed; when these are very large and have a lighter ground around them, they have been called tiger-coloured.

It is found from experience, that the varieties in colour influence, in some degree, the real qualities of the animal; and it may be regarded as a general rule, that dark horses are the best: yet this, like other general rules, admits of exceptions. White haired horses, like white haired persons, are irritable and weak; the hair after a wound is white, because the part is in a state of debility: this preference is more to be observed in the compound colours; and it is particularly remarked, that the extremities, when not of a dark colour, are more disposed to disease than others; hence, white legs are considered as a blemish. Of what colour the original horses were, we are unacquainted; the wild horses of travellers have been various. It does not appear that climate has the same influence on the colour of horses as on other domesticated animals. The horses of the north are white or black indiscriminately.

Of the varied FORM *of the* HORSE, *according to the several Uses to which he is applied.*

Having thus described the exterior conformation, and considered the various external parts of this noble animal, we will next glance an eye very cursorily towards his separate uses; for according to the purposes to which we apply his powers, so some variations in his form are convenient. The slender beauty of the race horse would make him ill calculated for heavy draught. And the grand lofty carriage horse would make but a poor figure as a light hackney.

For *racing,* we require that the greatest possible quantity of bone, muscle, and sinew, should be got into the smallest possible bulk. Every part in such a horse should be, as it were, condensed, and each organ bear evident marks of capability for quick and continued progression. In addition to great flexibility, and some length, the limbs must be strongly united, and systematically placed: the chest must be deep and capacious, and the hinder extremities particularly furnished with large muscles, operating on extended open angles.

The *hunter* must have more bulk and greater extent of form, to enable him to carry more weight, and to support it a longer time. In other respects, as almost the same qualities are requisite, so nearly a similar form, but more extended, is necessary. For if it requires that the racer should be very powerfully formed behind, to propel him forward in the gallop; so it is equally necessary that the hunter should be well formed in his loins, and well *let down* in his thighs; that he may have not only speed in his gallop, but that he may have strength to cover his leaps, particularly when they are extensive and numerous.

But in the *hackney* we look with as much anxiety to his fore parts, as we do to the hinder parts of the racer and hunter; and as in them the fore parts are rather subordinate to the hinder, so in the hackney, on the contrary, the hind parts may be regarded as of less consequence than the fore; for though speed is desirable, yet it is subordinate to safety. The head must be small, well placed, and well carried on a neck of due length: the withers high, the shoulders muscular, but not heavy; and, above all, they should be deep and obliquely placed. The fore legs must be perfect throughout, and stand straight and well from under the horse; and what in the hunter and racer is of less consequence, is here indispensible, that the elbows should be turned well from the body. The feet, also, it is requisite should be perfect, and the whole limbs free from stiffness. The height is not so essential in the hackney as in the two former; indeed, the best size of the hackney is from 14-3 to 15-1: he should also be square set, without being in the least clumsy; and with this form the more breeding he shews, short of full blood, the better.

Coach horses should be nothing more than very large hackneys; and whoever is at the pains to consider the matter attentively will agree with me, though it is not usual to regard the matter exactly as I have stated it. Horses for two-wheeled carriages should be the same, but something smaller. The former are perfect between 15-3 and 16-1; the latter between 15-1 and 15-2. No horse is so adapted for quick draught as a powerful hackney: why otherwise do we take such pains to lunge and rein up our carriage horses, but to lighten them before? When we again go back to old times, and read advertisements holding out safe and *expeditious* travelling from London to York in *six* days, then we may safely resume the old Flanders breed.

In *cart horses,* or those for heavy draught, a similar improvement has been attempted by lightening them materially; but though, when very bulky, they are certainly objectionable, yet I think, for this kind of horse, some bulk and weight are essential; for it is certain that these animals draw by this weight as well as by their strength. The cart horse should therefore be collectively, though in different proportions according to his various uses, bulky, square, and muscular; and it is peculiarly desirable that his fore parts should be equal in weight and substance to his hinder.

Sect. V.

THE PACES OF THE HORSE.

HAVING considered the horse in a state of rest, we will now consider him as an animal of motion, which leads to an examination of his natural *paces:* these consist of the *walk, trot,* and *gallop.* There are other artificial paces; but which, as they are now wholly in disuse, we shall waste no time in describing.

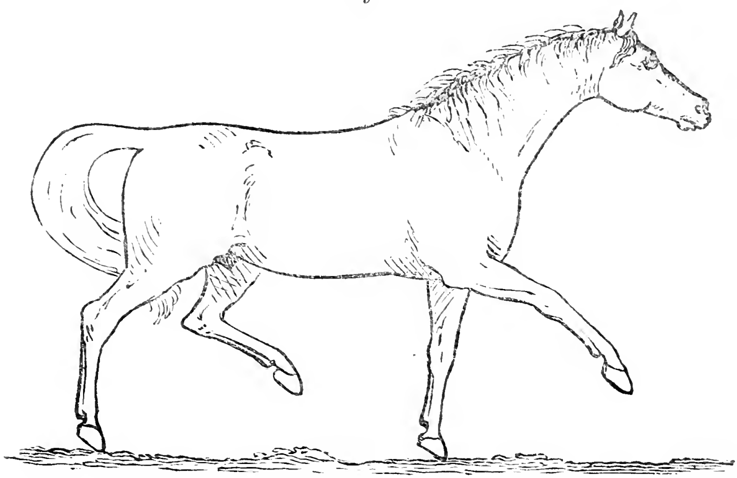
The progressive motion of an animal body is produced by a definite portion of velocity, communicated to the centre of gravity of the moving machine; and which is effected by the extension of the various articulations of the limbs previously in a state of flexion. It has been said, that, when the body of an animal attempts a change of position, 'it may be com-'pared to a spring divided into two branches, one of which 'rests upon a resisting body. If these branches, after being 'brought together by external force, be again set free, their 'elasticity will tend to make them recede equally, until they 'form the same angle with each other which they formed be-'fore their compression. But the branch which bears against 'the fixed body not being able to overcome its resistance, the 'movement will wholly take place in the opposite direction, 'and the spring's centre of gravity will be forced from the re-'sisting body with more or less velocity.' This appears a simple and correct idea of progressive motion. The flexors of the limb represent the external force that compresses the spring: the extensors correspond to the elasticity which tends to make the branches fly asunder; and the resistance of the ground represents the obstructing body.

The *walk.*—In walking, one of the hinder legs is first elevated and carried forward; the centre of gravity is by this means displaced, the chest thrown forward, and the fore legs become inclined backward; to relieve which, the animal moves the diagonal fore leg. In the next action, the other hind leg follows; the trunk is again thrown forwards over the fore legs; and again, to relieve it, the fore leg, that has hitherto been at rest, moves on. This is the most simple account of the walk that can be given; but the simplicity of this pace is by no means so great as may be at first supposed. It is not only completely altered as the animal conducts it slowly or quickly, in which cases it will be either successively or simultaneously conducted; but, like the trot, and the amble or pace, it may be performed either laterally or diagonally. Mr. Richard Lawrence speaks of the walk as a pace wherein one foot alone is elevated at a time; but this is correct only when describing a walk of the slowest kind, and even this is, at times, conducted two different ways. In the one, the legs are laterally and successively in motion; for the near hind leg being first elevated, is set down short of the near fore leg, which is then elevated, and, as soon as set down, the off hind leg is raised and set down short of the off fore, which then has become raised; and this finishes the round of action. On the contrary, in what may be termed the diagonal slow walk, and which is infinitely the most common, the legs move in the simple manner in which we began the subject. But when the walk is more rapid, its movements are attended with much more complexity. I have laboured to catch the cadences for whole hours, but have seldom satisfied myself. Mr. Freeman, in his elegant and elaborate work on horsemanship, thus describes this walk; and as his ideas on the subject of this pace are perfectly in unison with my own observations, I will use his comprehensive account of the matter. He supposes D to be the near hind, and C the near fore leg; B to be the off hind leg, and A to be the off fore; consequently they will stand evenly; thus, $\begin{matrix} D—C \\ B—A \end{matrix}$. This being premised, he proceeds, 'I found that, supposing A the off fore leg to begin, it was immediately succeeded by D, the near hind; but B, the off hind leg, seemed not to follow the fore leg at the same time as before (i. e. that was in the walk of the pace), but this was nothing more than the alteration of the poise of the body, when either the one walk or the other took place. For when B, the off hind leg, began, it was succeeded by A being lifted up; and when B was set down, D was lifted up. But A and B seemed in this walk so connected together by the poise being on the same side, that B appeared to begin. The poise being altered by the will of the horse, A seemed to begin, and not to be succeeded by B, being set down at the same time after it, as in the walk of the pace. D is in both cases taken up after B is set down; and when A is set down, C is taken up, to make room for D to be set down.'

It is evident that Mr. Freeman had, before this quotation, been describing the walk of the pace into which many horses may be hurried, and many others assume naturally, but which, in all, is now considered as a defective action, from the decrease of manege riding with us: without this be taken into consideration, Mr. F.'s description will appear somewhat confused. From the account I have given of the true walk, it will appear that whether it be conducted slowly or fast, the equipoise or balance will be placed diagonally, and so conducted by the supporting members; from this walk, therefore, the trot can be at once produced without disunion or change of centre. In the pacing walk, acceleration produces the amble, provided no change of centre take place, or, in other words, provided no interruption to the unison and harmony of the moving members occur: for, in this walk, the limbs act laterally, and not diagonally. The change of the centre or equipoise of the body is sensibly felt by the rider when either the walk of the pace, or the walk of the trot, is substituted for the other; but however attentively the eye may be fixed, it is very difficult to see the change at the moment it occurs.

The *Trot*.—This pace, when true, is always performed diagonally, but the limbs are very differently occupied, according as the action is conducted slowly or fast. In the slow trot, the diagonal legs are elevated and replaced simultaneously; while the other diagonal limbs remain on the ground to sustain the weight of the machine, though at the same time they are evidently making ready to take the place of the moving ones; which is exemplified in *Fig*. 1. This mode has been given as the true detail of the trot under all its degrees of celerity: but which is very erroneous; for when it is conducted in any degree beyond the slowest, there is a period in every spring made by the diagonal members when all

Fig. 1.



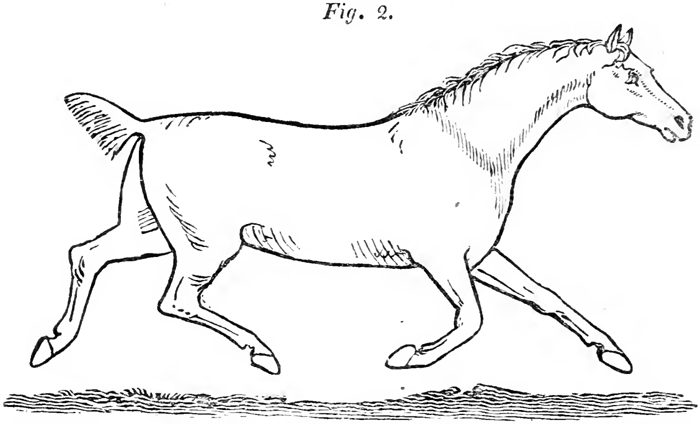
the feet are *in the air* at the same time, and the body completely suspended from the ground by these means. (See *Fig*. 2.) To exemplify this, we will suppose a horse trotting at the rate of nine miles an hour, and that the off fore leg and the near hind have been elevated in the air; in such a case, before they meet the ground, the near fore leg and the off hind are not only prepared, as in the slow trot, to elevate themselves, but in this accelerated motion they actually do so before the others are set down: consequently the feet at this precise time must be *all in air*, as seen in the 2d *Figure*. In the slower trot, as seen in *Figure* 1, the near fore and off hind legs are preparing for elevation, while the off fore leg and near hind are yet in action, and these raised legs are first set down before the near fore foot and off hind are actually removed from the ground. But as before observed, in a fast trot, these same feet are completely elevated above the earth, while the off fore and the near hind are in full progress. At which moment, it is clear the horse is *all in air*, and which complete elevation forms the essential difference between the slow and the extended trot. To pursue the description, the animal still acting on the impulse derived from the near fore and off hind, they become carried across the off fore and near hind at the moment these latter meet the ground. The off fore and near hind having met the ground, immediately prepare to rebound from it, and to give a fresh impetus to the motion before the near fore and off hind legs again come down; which then forms the second period, when the horse is *all in air*.

Thus it is evident that, after every impetus or bound, the horse is totally elevated and without support; having no feet at that moment in contact with the ground: on the contrary, he is as detached from it as a bird when flying, or as he himself is when leaping or galloping. If it should not be readily comprehended how the horse should be without support at any time during the trot, let us draw a parallel between the running and walking of a biped. In the *walking* of a man, one foot becomes first elevated, carried forward, and set down; during which the body is likewise carried forward, and the centre of gravity takes a new line through the moving mass. The contrary foot now becomes elevated also in its turn, and repeats all the phenomena of its fellow. In *running*, so essential a difference may be observed, that let running be conducted never so slowly, and walking never so fast, so that the speed shall be greatly in favour of walking, yet the paces will remain totally distinct. In the *running* of man, as well as in the extended trot of the horse, there is a period when all the supports are completely removed from the ground: for by means of the flexion and extension of the angles of one of the lower extremities of the man, a spring is made, which displaces and elevates the body, inclining it forwards, and taking the first elevated leg with it, which, before it meets the ground, is crossed by the other. The body, losing its impetus, waits for fresh impulse to be gained by the rebound of the limb which was last elevated. The body is now again propelled forwards; the contrary leg again passes to be ready to receive the propelled weight thrown on it, and again, by flexing and extending its angles, to relieve itself, it renews the action.

Now exactly the same happens in the extended trot of the horse as in the running of the man, for, in the trot of speed, the fore and hind diagonal extremities of the horse, acting in a synchronical manner, become formed into a single support, the centre of motion being placed diagonally across it; by which the superincumbent weight, although moving on two distinct members, yet as these members are acting in perfect unison and simultaneously, they produce one effect: and, in this way, this action is illustrated by the running of a biped, and corresponds with it.

Though the trot has not been generally understood, among horse amateurs, as being a pace wherein the feet were all in air at any one period; yet there are many other familiar proofs that put it beyond a doubt, and make it clear to the meanest capacity. It is evident, that the utmost limits to which the limbs could extend themselves would not cover the space which is passed over in the extended trot, were they continuous with it, but, by being propelled wholly from the ground, they are bound by no measure of continuity with it, as may be seen by marking the impressions in the earth. Neither will it be questioned that it is the two contrary or diagonal legs that are in motion at the same time; this is uni-

Fig. 2.



versally known. In any trot beyond the slowest, the near fore leg gives place to the near hind leg; that is, in action, the near hind leg sets itself down, not *behind* the fore leg, but though it moves in the same line, yet the hinder foot will be found to be set down considerably *beyond* the spot occupied by the fore foot. Now this could not be done unless both were in the air at the same time; that is, unless the near fore foot had been elevated before the near hind foot had been set down. It is unnecessary to carry this further, for it is already understood that the near hind foot being in action, the off fore foot must necessarily be so.

This may, however, be rendered still plainer by considering the action of overreaching or clicking, which occurs in heavy, awkward, or unbroke horses; but particularly where the hind quarters are high, the back short, and the fore quarters low and heavy. In these instances, the balance of power being with the hinder parts, and the angles favourable, they act quicker; and hence the hind toe is brought to the fore foot before that is altogether ready for it, or removed out of its reach: but in the worst cases, it never so far surpasses the fore foot in quickness, as for the hind toe to hit the fore heel; but it always meets the middle of the fore foot at its bottom part, being at the precise time that the foot has commenced its elevation; but which in case the action was perfect it would not do, for the fore foot would then have been completely elevated.

The *Gallop*.—What is called the gallop may be properly divided into three distinct branches, emanating from the same root. These are the fleet, racing, or gallop of full speed; the slow, or hand gallop; and the canter. It is not usual to consider the canter as otherwise than a slower gallop; but whoever will pay sufficient attention to the subject, will perceive that there are essential differences between the two. I am, however, not disposed to agree with foreign manege masters, who consider all the gallops as distinct paces; on the contrary, I think them all constructed of one and the same action: one proof only may be sufficient; which is, that the horse can change from either of the gallops into the other without art, and particularly without alteration of his centre of motion or equipoise, or without interrupting the harmony of the moving members, but merely by an increased or diminished effort of the same action.

The gallop of full speed is the most simple of all the paces, for it is nothing more than a succession of leaps. It is with difficulty commenced with its full celerity at once, the cause of which is evident; for it must require a very great effort to raise the foreparts at once from a state of rest by means of the loins, and to throw them forwards, at the first action, to a considerable distance by means of the haunches and thighs. This fact is well known to jockies, and other sporting characters, who often derive profit from the circumstance, by wagering with the unwary that no horse shall be found to gallop one hundred yards while a man runs fifty, provided each start together: but the foreparts being raised, the impetus is gradually acquired, till it arrives at its full momentum; in which the foreparts are raised and thrown forward by the flexion and extension of the angles of the hinder parts; and as both of the fore and both of the hind legs in full speed become opposed to the ground in succession at the same moment, that is, the two fore legs at once beat the ground together, and then the two hinder, so it is evident that the gallop of speed is nothing more than a repetition of leaps.

The *Hand-gallop*, when acted true, and with the right shoulder forward, may be described thus: At the instant the horse elevates his fore quarters by means of the muscles of the loins, he throws his fore legs also forwards, through the agency of the muscles distributed to the shoulders and arms: but it appears that he does not elevate his fore limbs equally; the right is raised a little more, and it is also carried a little further forward than the left. During this first elevation, and in some instances preparatory to it, the right or off-hind foot moves slightly forward, but only sufficient to gain a true centre, and to correspond with the increased forwardness of the right shoulder: the near hind leg yet remains fixed. The fore extremities now reach the ground, the near fore a little before its fellow, the off fore doubling over it and placing itself a little beyond it. The slower is the gallop, the more considerable, I conceive, will be the distance between the placing the fore legs. As soon as the near fore leg has met the ground, and I believe before the off fore leg has yet taken its full bearing, the hinder legs are moved in the following manner: the near hind leg elevates itself, and, as it reaches the ground, the off hind leg passes it, and becomes placed also. It is now that the horse begins to be *all in air;* for on the next spring that the hind quarters make, the fore quarters being already elevated from the last impulse, the animal is therefore completely detached from the ground. The next period when he is likewise so, is when the fore quarters meeting the ground gain an impulse by their rebound, and the haunches are again thrown in to take their share, and likewise to give their impulse.

The *Canter.*—Whereas, in the gallop of speed, the legs are simultaneous, in the canter they are directly the reverse; and whereas in the slow gallop there is still a period in which the legs are *all in air,* so in the canter it is the reverse also; for, I believe, at no period in this pace is the horse *all in air,* but has always a point of contact with the ground; and this I conceive to be the grand and essential difference between the canter and gallop. The canter appears to be conducted thus: When it is performed on the right, the horse commences by first placing his off hind leg a little beyond the other; at nearly the same instant he elevates the forehand, and places first the near fore leg on the ground; the off doubling over and beyond, is placed in an instant after it. In the next movement, the hind legs are thrown in, and, while elevated, the off fore leg becomes raised from the ground; but the near fore leg is not elevated till the hinder ones are replaced, and this, as remarked above, constitutes the grand difference between the canter and gallop. I believe this explanation of all the gallops, but particularly of the canter, is novel; but it is the result of close and continued examination of the subject. That there is a very considerable difference between these two latter paces, no one who is in the habit of riding, or who has any sensibility on a horse, can doubt. The sensation to the rider is as different as possible; and so is the action to the eye also. If this is established, it will call to mind that the whole weight of the body must at one time rest completely on the near fore leg; and that this does take place in the canter is, I conceive, evident from the effects observed: for it is a remarkable fact, though not sufficiently noticed, that all cantering horses have the near fore leg more deteriorated, and exhibit more of the effects of work than the off; and I have constantly remarked, that three out of four cantering or ladies' horses become first lame on the near in preference to the off fore foot and leg. This difference in the wear takes place only in a slight degree in horses which canter but little, but that trot and gallop occasionally; yet even in such cases if the gallop is often made use of, there is generally a superior tendency to wear discoverable in the near or left fore leg; because in leading, as is usual, with the right shoulder forward, in the moderate gallop, the near fore leg meets the ground first; and though as the impulse gained by the rebound elevates the near fore leg along with the off, yet it is not precisely, I conceive, at the same moment that they are elevated; but that the near fore dwells a longer period on the ground, takes an increased portion of weight, and acts as a centre of gravity longer than the off or right fore leg. Judicious horsemen, sensible of this, do not therefore permit their horses always to lead on the same leg, but frequently change, and gallop, canter and trot, sometimes with the right, and sometimes with the left, shoulder forward.

Leaping is performed by a sudden extension of all the inferior articulations, immediately after they have undergone an unusual degree of flexion. This extension gives to the bones that compose these articulations, a violent motion, which communicating its impulse to the centre of gravity of the body, it is projected with a determined velocity which is more or less in opposition to its weight. The projectile force, and consequently the extent of the leap, depends on the proportional length and obliquity of the angles formed by the bones and the strength of the muscles: hence becomes apparent, what has been before so strenuously insisted on, which is the necessity that hunters as well as racers should be so formed behind, as at once to unite great strength with length. Nevertheless, it does not necessarily follow, that a large horse only can take considerable leaps; for, *cæteris paribus*, small animals leap proportionally further than large: for the projectile force impressed on two bodies being in proportion to their different magnitudes, their velocities will be equal, and the extent of the space through which they pass will depend upon their respective velocities. Thus a small horse with a small weight will frequently leap very considerable distances, and to a very considerable height; but from the greater extent of the angles, and the increased force obtained from larger muscles, it is obvious that a certain size is necessary to the hunter, and peremptorily so, if much weight is to be carried.

The direction of a leap depends on the situation of the centre of gravity, with respect to the limbs by which the impulse is given. Man and birds having the trunk situated immediately over the impelling limbs, are the only animals that leap vertically. Hence, when a horse attempts a standing leap of considerable height, as a wall, high gate, &c. he raises himself almost perpendicularly, and the elevation of his body will always be found correspondent to the height of the object.

Sect. VI.

CONDITION OF HORSES.

CONDITION is, properly speaking. nothing more than the appearances that denote perfect or imperfect health. When a horse is in perfect health, he ought to be considered as in perfect *condition;* and, on the contrary, when a horse is in any respect out of health, he is, to speak correctly, out of *condition;* that is, in a *condition* that neither fits him for perfect service to his owner, nor for perfect comfort to himself. But *condition* is used with a latitude of expression much exceeding this, and in its popular acceptation is more comprehensive but less correct in its signification. Thus a farmer rides a horse to market in full vigour; but, perhaps, from constant exercise, he is not full of flesh, and probably, from being exposed to the air, he may have a very rough coat. This horse, in the popular acceptation of the term, would not be said to be in *condition:* and though he may be in a state to do every thing a rider ought to require of him, yet, if he should pass in this state into the hands of a dealer, he must make some material alterations in him before he the dealer will pronounce him in *condition,* or before he can expect to sell him as such. Having, however, passed through some changes is his appearance, and being now termed by the dealer in *condition,* he would yet be found by the amateur to want further alteration before he would be fitted to undergo severe exercise, or to be in a *condition* to hunt, or even to work as a superior hackney. Supposing him to have undergone some further changes, still in this improved state, if he should pass into the hands of the race jockey, his *condition* will be again to be most materially altered before he can be at all considered as in *order* to *run.* This popular term, therefore, comprehends a variety of states and degrees; some dependant on the real necessities for alteration in the state of the animal, according to the several uses to which he is applied;

and others founded on an artificial taste relative to his exterior appearance. That *condition*, even in its most corrupt signification, is of necessity varied by the uses of the animal, is exemplified by what might with propriety be considered as perfect condition in the cart-horse, and what might be equally so regarded in the hunter, and which will, on the slightest inspection, be found to be very different. In the cart-horse a fulness and rotundity of bulk, instead of hindering his exertions in moving under and in drawing heavy loads, materially assist him: whereas exactly the reverse takes place in the hunter, and indeed in a degree in all the varieties of horse used for riding, and even for very quick draft, as mail coaches, &c. &c.

Perfect condition in every variety must, however, embrace some common properties in all: it requires such a state of the body both internally and externally, as fits its various organs to act uninterruptedly for the benefit of the whole, and thus much, it is evident, is equally necessary for the heaviest cart-horse, as for the fleetest racer: but in the lighter varieties, in addition to this, perfect condition requires a state favourable to accelerated and long continued motion, and which consists in condensing the greatest possible quantity of animal fibre, particularly of pure muscle, into the smallest possible bulk, and of promoting by every means the absorption of the useless and hurtful incumbrance of fat or other interstitial matter, and of preventing the future accumulation thereof; all which are essentially necessary to unite the grand desiderata of lightness of body, with full strength and elasticity. This state may be considered as one of *perfect condition,* and it is in the attempts to produce such a state that all the art of *training* consists: but whether a total departure from Nature's rules by unnatural heat, deprivation of light, stimulating food, restraint from water, and excessive clothing, are best calculated to promote these ends, time will shew. And it would appear that such time is approaching, for even now this system is beginning to relax in many of the first training stables, and the light of truth and of nature is forcing a ray through the almost impervious casements of these 'prison houses.' It is a mere argument of necessity to plead that 'the English racers of the present day beat all the horses in the world:' might not both their speed and durability, but particularly the latter, be still further increased by a different plan, and one more consonant with Nature? And even if it be granted, that neither the speed nor durability are augmented by the plan, would not the time, the labour, and the expense saved by it, be well worth its adoption? and can it for a moment be denied that it would be one infinitely superior for the general health of the animal? Until the experiment was tried in Yorkshire, and in a few other places, the systematic trainers of hunters could not be brought to believe that such horses might be kept out of doors (with advantage to every thing but to the appearance of their coats) during the whole of the hunting season. Having thus taken a hasty view of the term *condition*, both in its popular and correct significations, I will now proceed to a consideration of that want of it, which may be considered as a disease at present existing, or as tending to promote one.

The accidental causes of ill condition are various: a very common one is found in injudicious feeding, both as to quality and quantity. Any sudden alteration in the articles of a horse's diet, will frequently, according to the term of horse amateurs, '*throw him out of condition*,' such as removing him from the grass field or the straw-yard to a full allowance of dry hay and corn, with a paucity of water to draw up his belly, all which are perhaps done at once, without any previous preparation. In these cases the alimentary canal, being yet hardly in a state of capacity, suffers from the increased powers necessary to draw nutriment from substances, although in themselves more nutritious, yet in this instance less digestible than those before in use. It follows, from the constant sympathy between the stomach and skin, that the latter soon follows the derangement of the former, and assumes the well known appearançes of *ill condition* also. A sudden remove from a generous to a poor diet is unfavourable to *condition* likewise, for in such case the chyle or nutritious pabulum from whence all the vital organs are recruited, and all the vital energies derive their vigour, cannot be separated in sufficient quantity to perform these important purposes; the blood thereby becomes deteriorated; universal absorption takes place of the less hard parts, which produces lessened bulk; while a laxity of fibre in the remaining portions is productive of languor and debility.—The quality of the food is also of considerable consequence to the *condition*. Mow-burnt hay, by exciting a partial diabetes, is very apt to hurt the *condition*. Musty hay also, and oats highly kiln-dried, have an unfavourable effect on the condition. The liquid aliments should also be attended to in a consideration of the *condition*. Mineral waters are unfavourable to it in most cases; although there is reason to believe that, in some morbid affections, they are salutary. Sea water may be considered in the same light; but a continued use of the brackish water found near sea-bathing places is unfavourable to condition; to which cause, united with the bad care usually taken of horses in the stables on the coast, I attribute the very common state of *ill condition* in which they so frequently return from thence. Badly ventilated stables, excess of clothing, and deprivation of water, are also frequent causes of *morbid condition*, as I have often witnessed; for, in some of these cases, after purgatives, alteratives, attention to diet, and all the usual means of promoting condition, have failed, a proper quantity of water, a well regulated but perfectly cool stable, with a free access of air, and very moderate clothing, have created an immediate change. An inordinate quantity of exertion, particularly if continued unremittingly for several days, will often produce a *morbid condition;* and this, in cases where the feeding has been, as supposed, equal to the tasks required. In such cases, it is clear that the stomach, already weakened with the general debility, has yet a double task to perform in digesting a larger quantity of nutriment than usual to make up the increased wants of the constitution, and thus the evil is increased by adding the further deterioration of this organ to the others. Drastic purgatives, or violent remedies, as the mineral acids, when injudiciously continued, reduce the *condition* very quickly, and sometimes irrecoverably. Another principal cause of want of condition is, the alternation of heat with cold. A sudden check to the natural or acquired heat of the body, particularly if aggravated by the evaporation of a perspiring state, if it should not bring on topical inflammation of some vital organ, yet it frequently acts on the outer coverings of the body; the capillaries of the skin appear to become constringed, and the unctuous matter secreted by the sebaceous glands seems either vitiated or lost, by which the elasticity and pliancy of the hide become lessened, and the hair instead of lying smooth, and appearing glossy, for want of the unctuous secretion, becomes elevated, and feels hard and dry to the touch. The dandril, or scurf, is also applied more closely to the skin, instead of separating and falling in daily scales, and adds likewise its share to the general derangement of the outer expansion. Further than this, by a well known consent of parts between the skin and the alimentary canal in general, but between the first passages and the stomach in particular, it follows, in almost every instance, that when one of these becomes affected, the other takes on a sympathetic derangement also, and the condition is then morbid throughout. From close observation and the accumulation of numerous facts, I am disposed to think, that so perfect is this sympathetic consent between these two distant parts or organs, that they change the order of attack as circumstances occur. Thus, when the skin is primarily affected, the stomach becomes secondarily so, and *vice versâ.* In the application of cold to the surface, it appears clear that the primary cause originates with the morbid attack on the skin; and, when we consider the structure and functions of this investure of the body (see *Skin,* in Splanchnology), we need be at no loss to account for an inelastic or *binding* feel of the hide, as one of the distinctive marks of *want of condition*.

Hide-bound is therefore a natural accompaniment to this ill-conditioned state of the skin: and it may be gathered from what has been said, that it is never a disease singly and of itself, as it is very generally supposed to be. Hide bound is only an appearance common to any state which deranges the secretory and perhaps excretory functions of the skin; and in this it accompanies, by a common consent of parts, most chronic affections of long standing. A long-continued gleet from the nasal membranes in glanders will produce it. The distant attack of farcy on the hinder extremities is accompanied by it; and the skin affections of cracks, grease, and mange, claim it as a companion also. In fact, any means which are capable of producing an absorption of the cellular and membranous medium between the skin and muscular expansion, by which its motions are regulated, binds it down so firmly to this fleshy pannicle, as to confine its extension and destroy its usual elasticity.

The treatment of hide-binding must necessarily, therefore, blend itself with the general treatment of *morbid condition*. The primary affection of the skin is not always, however, confined to an inelasticity of the hide, nor to the staring of the hair upon it: for sometimes, from a kind of reaction and inflammatory process in the deranged and obstructed vessels, small tumours become formed, generally extending pretty universally over the skin: which affection has received the name of *surfeit*.

Surfeit, which among common farriers, grooms, and others, has been erroneously considered as a distinct disease likewise, may therefore be characterised as a symptom only, generally dependant on a primary affection of the skin. In a few instances I have, however, traced it to a deranged state of stomach, brought on by eating noxious vegetables, and, in one instance, it was produced by the musty quality of the hay. *The treatment of surfeit*, as well as of hide-binding, must therefore follow the principles applicable to *ill condition* in general. In a somewhat similar point of view we may also regard *moulting*, which, though not a disease, yet, as the effort occasioned in some instances by the formation of new hair produces no small derangement in the system, so the process, particularly the autumnal one, frequently affects the condition sensibly.

Moulting.—During the spring and autumn, all horses change their coats; at which times the vessels of the skin are in a state of increased action, for the purpose of forming a new growth of hair; and, as such, all the effects of slight fever are present. Horses are then weak, easily sweat, are chilly, suffer from thirst, and are irritable and low. Moulting therefore, more or less, puts every horse out of condition; and in the early part of the hunting season, the inconvenience of this is severely felt. At such times, it is prudent not to dress horses much, particularly with the currycomb, that the old coat may not be too quickly forced off, before the other is grown. Warmth, both in the clothing and in the temperature of the air, is salutary. Plenty of chilled water should also be given; the exercise should be moderate, and the food liberal, but not too heating.

The cases in which a *defective condition* is primarily seated in the alimentary canal, have been already hinted at. It may be further remarked on it, that here also some symptoms are mistaken for original and distinct diseases; among which stands the old affection of the mouth, called *lampas*. (See *Diseases of the Alimentary Canal.*)

Lampas is a symptom of that derangement of the stomach, and its recipient passages, which sometimes follows, and sometimes precedes, the binding of the hide, unthrifty and staring coat, &c. &c. *Its treatment* must, therefore, fall under the remedial plan detailed for the removal of morbid condition.

Ragged teeth.—Not unfrequently, in old horses, the teeth become unevenly worn, and now and then actually decayed; in which cases as they grind the food less minutely, so they rob the animal of a portion of his nutriment, and thus injure his *condition*. (See *Teeth, and their diseases.)*

Crib-biting.—This proceeds likewise from a deranged state of stomach, and is, therefore, a frequent, though not a constant, companion to the other symptoms of defective condition. (See *Crib-biting*.)

The immediate change which takes place in the alimentary canal in the state called *out of condition,* is not sufficiently defined; and, whether it be a diseased state of structure in its surface, or whether it may arise from a vitiation of the secretions of the parts, is not altogether clear. If we argue from some appearances which occur, as the swollen state of that cuticular portion of the alimentary canal which lines the mouth, called *lampas,* and the thickened state of the cuticle of the tongue also, we should be led to infer a diseased alteration in the cuticular lining of the canal itself. I have also observed, in two instances which occurred of horses having been accidentally killed, both of which were very much out of condition, that the cuticular portion of the stomach was relaxed, and streaked with inflamed marks, nor was the secreting or villous portion without some marks of affection also. On the contrary, in crib-biting, which is evidently an eructation of a small quantity of gas, it would, from reasoning analogically, induce me to believe that the secretions themselves might become vitiated, and that this affection, however, and some other of the symptoms of morbid condition, were purely dyspeptic, and dependant on a vitiation of the secreted juices, whereby an acetous fermentation became excited in the aliments, instead of a healthy conversion of them into chyme. But, whether one or both conjointly produce the effect, it appears certain that the complaint of *morbid condition* is one which, in many instances, with a few modifications, very much resembles the dyspepsia of the human subject, both in appearances and effect, of which the thickened and whitened state of the lining of the mouth, the viscid mucus which is seen within it, and its increased heat, are parallel effects. It would appear, also, that no part of the digestive organs can become affected without the distinctive mark of want of condition being produced, that is a morbid state of skin: in this way

Worms within the stomach and intestines, but principally the latter, will affect the *condition* most sensibly. It appears from observation, that the bots, which are found within the stomach, are seldom hurtful; but that both the lumbricus, or large round worm, and the ascarides, and still more particularly the whip worm, all which inhabit the intestines, are often hurtful to the general health, and, in which cases, the skin sympathises in a more than ordinary manner.—This subject is further pursued under the head *Worms.*

The treatment of morbid condition.—From what has been said, it will be evident, that, as many causes may produce defective condition, so it would, in every instance, be favourable to the removal of it, were the cause clearly ascertained. The description entered into will assist to this end, while the general treatment does not differ materially in any cases, but those particularly pointed out. From a review of the explanation afforded, it may be gained, that, in almost all cases, a judicious attention to the digestive organs will be found to afford the most ready and certain means of relief. When the *morbid condition* is consequent on an attack of cold on the skin, whereby the capillaries suffer a sudden translation of their blood into the interior of the body to the evident injury of the organs, thus congested by these means, the remedial plan is still best promoted by stimulating the stomach into a sympathy with the exterior surface. Nauseating medicines in the human most readily affect the skin, and relax it into a moist, perspirable state; but, as there are very few drugs capable of nauseating a horse, and still fewer that will do it mildly, so our dependance on antimonials, salines, &c. to produce this effect in the horse with certainty, or to any considerable extent, is but moderate. But, although I am free to confess, that, from some late experiments, and from extensive inquiries among the best veterinarians, I do not attribute so much activity to antimonials, and to some other articles that have hitherto composed part of the veterinary pharmacopeia, as I did formerly, yet the very same inquiries and experiments have more and more confirmed my conviction, that benefit is often obtained through the means of antimonial alteratives when there is much plethora or fulness, or when the skin is particularly constringed; and still more so when it is affected, as in surfeits, with either small bumps or swellings, or partial detachments of hair. Nor does it appear, *à priori,* that a relaxing effect on the skin can be produced through no other agency than that of actually nauseating the stomach. The very peculiarity of structure which has rendered this difficult in this animal, might, from analogy, lead one to suppose that the means of relaxing the skin are not altogether wanting, but that they are translated to other media. In this way, antimony received into the blood may relax the vessels themselves, and the extreme surface in particular, without much disturbance to the stomach itself; and which appears more than probable, for it is most certain, that, in the above cases, the effect of antimonials on the skin and hair in particular, and on the other symptoms of morbid condition, are often striking. In other cases, as in those strongly marked with atony and emaciation, the tonic effect of mineral acids and bitters, as well as of the stimulating agencies of warm spicy matters, and, in some instances, of the more diffusible stimuli of ale, malt, barley, oatmeal gruel, &c. &c. experience proves to be best adapted to promote the desired end.

But to proceed with this important subject with some regularity, I would direct that in young plethoric horses, with much flesh on them, and which are, of all others, the most subject to take on this state of *morbid condition,* that from one or two moderate bleedings may be premised, particularly in such as have been full fed for some time previous. If the inner surface of the eyelids, or of the nasal membranes, shew any tinges of red, it is still more necessary to bleed; and in such case I continue the same until this inflammatory appearance is removed. I have found this, united with mashing, in many instances sufficient to relax the hide and reduce the rugous tumefaction of the lampas.

But in general cases, some internal remedies will be found assistant to the cure. In instances like the former, or those happening to a young and plethoric patient, one or two very mild doses of physic, preceded by a nightly mash, into which ten grains of submuriate of mercury (calomel) has been mixed, are proper. If there be joined to the affected hide, and the swollen or clammy mouth of lampas, any eruptions on the skin, or any cracks of the heels, stable soiling, or even daily turning out to grass, are advisable; but as these cases usually happen when the animal is either at present wanted, or is intended soon to be used, so I have not mentioned *turning out* altogether: but if these appearances prove obstinate, such a course will be advisable. When neither the partial nor total turning out to grass is convenient, and when soiling is likewise not practicable, still the use of carrots as the manger food can be resorted to. To this treatment may be added, after the administration of the physic, a nightly alterative. (In thus recommending carrots, soiling in the stable, partial or total turning out to grass, &c. for an ill-conditioned horse, I shall startle the systematic trainer, who will perhaps exclaim, What can these have to do with *condition?* But I would request such to consider, that I am here treating of an actual state of *diseased condition,* which must be first removed by a regular medical plan of treatment, before any efforts can prove successful in promoting that *artificial condition* so much desired by him, and indeed by most amateurs of the present day). Either of the following formulæ may be tried, as best suits the veterinarian's view of the matter.—(See also *Alteratives,* in *Mat. Med.*)

Crude antimony
Supertartrate of potash *(cream of tartar)*
Nitrate of potash *(nitre)*
} of each two or three drams.

Or,

Supertartrate of potash.........two or three drams
Nitrate of potash...... ....ditto
Powdered sulphur..............half an ounce.

Either of these will gently stimulate both the stomach and kidnies, and produce, by consent of parts, a favourable effect on the skin, and hair also. Violent diuretics are never advisable; nor have I seen their mildest form, unaccompanied by other remedies, produce much good, unless there has been joined to the other symptoms, swelled legs, either with or without discharge.

When *morbid condition* arises in horses which, from age, previous deprivations, severe work, long confinement in bad stables, or feeding on unwholesome provender, are not to be supposed plethoric, yet in such cases, if no actual debility is present, I have often derived great benefit by commencing the treatment with a very mild dose of physic, the horse being previously fully mashed, to make a small quantity of aloes sufficient; for I have generally found that the stomach tonics to be afterwards administered have had double effect for this previous preparation of the alimentary canal. But where the debility has been extreme, or where there has been already sufficient laxity of bowels, or perhaps even super-purgation from drastic physic, begin at once with either of the following tonics, or of any of those detailed under that head in the *Materia Medica:*

Socotrine aloes, in powder............one dram
Winter's bark, ditto...............two drams
Ærugo *(verdigris)*....................one dram
Treacle or Honey to form a ball.

Or,

Oxide of arsenic *(arsenic)*..............8 grains
Pimento *(allspice)* in powder..... ......1 dram
Extract of gentian.....................half an ounce.

Make into a ball with liquorice powder. Or,

Sulphat of copper.....................a dram and half
Sulphat of iron........................ditto
Powdered ginger.......................a drachm
Horse turpentine to form a ball.

Either of these formulæ may be given some time in each day, at the convenience of the practitioner or owner. It would, however, where practicable, be more prudent to let it be given in the morning, fasting, allowing the horse but a handful or two of hay for an hour after its exhibition. If a liquid be preferred, either of the above forms may be dissolved and horned down as a drink with ale. In cases of *morbid condition,* marked with emaciation and debility, a full allowance of carrots is advisable; and in default of them, or alternating with them, malt mashes or speared corn may be usefully brought in aid of the other tonics.

The essentials of the common cases of morbid condition, as far as regards their immediate medical treatment, are comprised in what has been already said. More may be gained by a reference to the numerous articles connected therewith. What relates to aliment, to stabling, clothing, exercise, &c. proper in these cases, may be gained from the subject which immediately follows. I have here to add, that, as a topical auxiliary remedy, I have derived great benefit, in cases where the skin has been peculiarly hard, dry, and scurfy, but particularly where the hair has fallen off in patches, as after surfeits, &c. from the use of flower of sulphur mixed with oil, and rubbed well into the skin every other day for a week.—I shall now proceed to the process that appears the most natural, and which my experience has proved the best adapted to promote *a condition* fitting the horse for useful purposes, on his removal from situations in which, although probably in sufficient ordinary health, yet the state in which he will be found is requiring an artificial alteration to accommodate him to the artificial uses required of him.

Getting a Horse into Condition.

When a horse returns from grass, or straw-yard, both his external appearance, and the internal state of his body, in general, require considerable alteration before he can be said to be in such a state as to fit him for the extraordinary exertions which luxury or commerce have rendered common.

These alterations are popularly called *getting a horse into condition*. It should be first impressed on the recollection, that nothing is more imprudent than to take a horse from so moist a food as grass, and at once to place before him hay and corn, without caution or limitation. When he returns from a straw-yard, this caution is not so immediately necessary; yet, even in this case, corn should be given at first sparingly: but in the removal from grass, both corn and hay should be given with considerable restrictions. The hay, for the first two or three days, should be moistened, by sprinkling it with water: the corn should also be given in very small proportions, mixed with bran, and mashed. Great caution is also necessary with regard to the variation of temperature likely to be experienced between the former and the present situation. It is highly improper to remove a horse from grass or straw-yard at once into a warm stable; on the contrary, he should be placed at first in a loose box, barn, or other cool open place. If any green meat can be procured, for the first three or four days give him some of it; and if this is not at hand, carrots may be possibly obtained; and, in default of both, let the hay be moistened, as directed, and let plenty of water be allowed to drink. A bran mash should also be given every night, so as to keep the body gently open: a moderately relaxed state of bowels, under these circumstances, greatly promotes condition, and prevents the coat from *setting* as it is termed, or the skin from becoming hidebound. No fear need be entertained, that, by this mode, the flesh will not harden, or the belly be got up. A week or ten days more time may be required by these milder and more natural means than those usually practised, but the future state of the condition will amply recompense their adoption. It is the hasty change from the one state to the other, that produces so many failures in getting a horse into *condition*, and brings on the various appearances of hidebound, surfeit, chronic cough, &c. &c. After ten days or a fortnight have elapsed under the prescribed plan, and after having removed the horse to his usual stable, but which should be still kept very airy and cool, give a mild dose of physic. A very mild one will operate sufficiently, if the bowels have been kept properly open; and in any case, it must be recollected, that very strong purging medicines protract the condition materially.

When this first dose of physic has set, give dry corn daily, and a bran mash every other night only; increase the exercise, which, before this, ought to be but moderate; and now begin to dress the skin with a currycomb, which before ought to be only whisped and brushed; and as the coat will now probably begin to fall, increase the warmth of the stable, but still to a moderate temperature only. In a week or ten days from the setting of the first dose of physic, give a second, rather stronger; after which, the feeding, exercise, and warmth*, may be increased to the full quantity intended: dressing and trimming may be now pursued to the desired end; and, if it be thought necessary, or that the horse be intended for hunting or racing, a third dose of physic will finish the process. To the *thorough-bred* groom, and to the professors of the quackery of *training*, this plan of promoting condition will appear infinitely too inartificial: but as I wish to teach from principles, so I will venture to affirm, that in a due observance of these simple rules consists all the mystery of *training* and *getting into condition:* whatever is added to these, outsteps nature, and generally defeats its own purpose.

Sect. VII.

STABLING OF HORSES.

The Stable itself.

ON the important circumstances connected with the state of confinement in which we necessarily place our horses, if I should be found to have dilated much more than in the former editions, a sufficient reason will at once present itself, when the extreme importance of the subject to their well being is considered. In this examination of the matter I have purposely avoided all topics directly unconnected with the health of horses: these are the immediate province of the riding-master and groom, and to them I leave them.

The stabling of horses, as it is wholly a deviation from Nature, so it surely paves the way to the attack of many diseases; and we really find that the higher this artificial system is carried, so much the more are the horses which become the subjects of it, obnoxious to disease. A stable should, therefore, be regulated on principles which the least tend to this hurtful effect: one of the principal circumstances, and that in general too little attended to, is to have it sufficiently airy and cool. It is supposed that warmth is congenial to horses, particularly of the blood kind, as being originally natives of a warm climate; but few arguments will bear examination less than this. Horses are natives of all temperate climes; and although our own have been mixed with eastern blood, yet the various intermixtures it may be supposed, and indeed has been proved to, have destroyed the constitutional exotic peculiarities, and to have enabled

* In using this expression I am complying with the popular prejudice in favour of warmth. It is in vain that my single and feeble voice is raised against any thing but *a very moderate temperature* for our stables at all times; but I do not despair yet of seeing the time when truth and nature shall predominate over error and the malversation of art.

them now to exist best under the common circumstances in which they are placed. Neither will the argument in favour of heat apply with much more force for full-blood horses than for others; for a removal from the common agencies of a particular climate soon lose their force, and the constitution soon learns to submit to the new agencies resulting from the climate to which an animal may be removed; and in a few generations he wholly loses the dependencies of an exotic. Our game fowls, although original descendants from the poultry of the east, are now indigenous and equally hardy with any other of the feathered tribe. The beautiful camelia japonica, which, a few years ago, would live only in a green house, with artificial heat, will now bear exposure to the rigours of a British winter without doors: and the blood horse, or eastern variety, experience shews, does not require more heat for the purposes of a healthy state than any other. On the contrary, the same experience convinces us, that to confined stables, where the same air is rebreathed over and over, and where the enervating effects of unnatural heat are always present, we owe many of the diseases which swell the veterinary catalogue, and which is fully proved by the trifling ailments which befal those who are never or seldom confined. Is the animal inhabitant of every description of the east confined in his bulk? is he equally confined in his energies? and is his life shortened by the agencies of a torrid zone? and can we expect our animals to ripen into bulk, to foster into strength and activity, and to push life to its utmost verge by the self same means which retard it in other climes? Is it not alike repugnant to judgment and experience to expect to keep animals in health, that, from stables heated to sixty degrees, and further protected from cold by warm clothing, are first stripped, and are then at once exposed to a temperature at the freezing point?—and yet such is the daily fate of thousands of our best saddle and carriage horses. It will, perhaps, be argued, that exercise makes up with them the deficiency of the heat and clothing they have left; and such would be the case, were they to be constantly in exercise when out: but how often do the finest carriage horses wait for hours exposed to the cold? nor are saddle horses, however valuable, exempt from the same treatment. If, as (it is hoped) has been proved, this unnatural heat be not necessary to the well being of the health of even the full-bred or eastern variety of horse, now he is domesticated with us, what benefits, it may be asked, are really gained by the continuance of this system so obstinately persisted in? The benefits gained, are, the satisfying a sophisticated taste for an appearance wholly unnatural to the animal. It is contrary to Nature to expect or desire to see a horse with a sleek glossy coat in winter in any clime, but in our own particularly, for here Nature provides specifically for the rigors of her wintery blasts, by giving a long warm exterior covering: to avoid which provision, we invert her order, and keep up a tropical climate by heat and clothing; and under which treatment the constitution, not being subjected to the stimulus of necessity, provides a covering suited only to the climate the stable represents. Removed from this unnaturally heated temperature, when horses enter on their work, it is evident they at once enter a new climate, rigorous in itself, and rendered still more so by being forced into it naked and deprived of both natural and artificial clothing: under which treatment can it be wondered that they become subject to disease? and that they are not still more so, is attributable only to that wise provision of Nature in giving capability to resist ordinary changes of temperature, but which capability is unfortunately not always present, as in debility, constitutional predisposition, &c. &c.

In all cases it is desirable to have the heat of the stable graduated by a thermometer, always kept there for the purpose; and that such heat should not exceed 50 degrees of Fahrenheit in winter, or 60 or 65 in summer. To renew the air, the stable should be well ventilated, and such ventilation should be as near the ceiling or top of the stable as possible, as the impure air ascends. The ventilators, sometimes seen, which revolve quickly on their own centres, are not, I think, good, because they occasion a draught of air; for which reason also windows should not be so constructed as to open directly on either the head or the stern of the horse. Windows so situated and constructed may be easily so altered as to admit the air, and yet to break its direct current. One of the very best methods of ventilation is by means of one or more tubes or funnels, according to the size of the stable, which should be let into the cieling of the stable by a larger end of twelve or eighteen inches square, which, as it ascends, should narrow at its summit to about four or five inches, and this should pass out at the roof of the building, having a raised cup over its top to prevent the wet from descending. Light is essentially necessary to a stable; when it is otherwise, the newly received light the horse gains when he goes out, is a painful stimulus to the eyes, and his imperfect vision makes him start; and, however horses may be supposed to fatten in dark stables, and which itself is questionable, it must be the fat of a pig, and not the lusty and cheerful gain of a horse, open to the cheering influence of the sun. Stables should be well ceiled, and that very closely: when this is not the case, not only does the dust from the hayloft fall on the horse, but it frequently enters his eyes; and the impure air, composed of nitrogen and ammoniacal gases, which always ascends, lodges in the hay above. In fact, it would be better that both the hay and corn should be altogether removed from the sphere of action of the ammoniacal effluvia of the stable. It is still more improper to keep hay or corn immediately within the stable: these articles should be brought to the animals as they are wanted. Narrow stalls are very prejudicial to horses; strains in the back are often occasioned by them; and whenever a stall is less than six feet wide, the groom should have peremptory orders never to turn a horse in that stall, but always to back him out. Bars or bails are also objectionable, from the ease with which horses may play with and kick each other over them, and likewise because it is seldom that horses eat alike in point of quickness; and thus, when they are separated by bars only, the slowest eater gets robbed of his food.

The acclivity of the generality of stalls is also a very serious objection to them, for they occasion a horse to stand unequally; and an undue proportion of weight is thrown on the hinder extremities, and the appui or bearing of both hind and fore becomes incorrectly placed; by which the flexor tendons, or back sinews, are put on the stretch to correct this departure from the true perpendicular of the limbs; to which circumstance there is little reason to doubt many of the lamenesses of horses are attributable. The ground should be either even, or made with only a very slight slope. To remedy the inconvenience of the urine not flowing freely off, in many stables, where the stalls are level, in the centre of each stall is placed a small grating which covers a little well immediately under the horse's belly. But this is not only disadvantageous because it is inapplicable to mares, but it is more particularly so because it retains the urine, which thus continues to diffuse at every moment the effluvia it should be so much our study to avoid. It is much better that each stall should be furnished with a grating placed over a small drain, so constructed, as immediately to carry off the urine or washings from each horse into one common cesspool. It is of more consequence than is supposed that this accumulation of liquid matters from a stable should be completely removed out of doors, to prevent its saline exhalations from injuring the air within. Such a cesspool, or well, should be perfectly secured against the access of the external air, otherwise a current injurious to each horse will pass up through the gratings. Professor Peal, in his excellent *Observations,* has entered largely into the injurious effects of the ammoniacal exhalations arising from the urine: to these he attributes, in a great measure, the ophthalmia by which so many valuable horses are ruined. This separation of volatile alkali is not confined to the urinary secretion alone—it extends to the fæces also; to the insensible perspiration as well as to the sensible. The urine, from the experiments of that able chemist Dr. Egan, begins to separate ammonia in a few hours after its separation from the body, and there is reason to suppose that the fæces as readily fall into this early decomposition; therefore the greater necessity exists for their early removal. The extreme pungency and stimulating qualities of this volatile alkali are familiar to our senses on every entrance into a close stable; and when soiled litter has been suffered to accumulate, even in those more open, we may remember how painfully our eyes and noses have been assailed by the acrid effluvia. Is it to be supposed that the animals themselves, who are by nature intended to live in the purest atmosphere, and all of whose organs are remarkably susceptible of stimuli, can receive the daily, the hourly attack of this unnatural agent without hurt? It will therefore be evident that cleanliness, in every sense of the word, is also necessary in a stable, but particularly in the frequent removal of the urine and dung that falls, and in a daily change of all the soiled litter.

There is much contrariety of opinion relative to the propriety of permitting horses to stand during the day on litter: there are cogent arguments for and against it. Litter entices horses to lie down during the day, which, if the sloping be too great, or if they be in constant severe work, is certainly desirable. Litter, likewise, when the stable is paved roughly, prevents the unevenness of the stones pressing on the feet. On the other hand, horses are very apt to eat their litter, and which often proves unwholesome. It is, likewise, too apt to retain the urine, and thereby to generate the acrid salts we have described. Constantly standing on the litter makes many horses' legs swell, which is proved by removing it, when such legs immediately return to their proper size: the warmth and moisture retained, likewise, are very apt to occasion cracks and swelled legs. Those who are advocates for litter under horses during the day, should, however, be very careful to have it changed as often as it is either soiled or wet. But whoever attends minutely to the subject on an enlarged scale, will be at no loss to determine on the propriety or impropriety of suffering horses to stand constantly on litter. It is my opinion that this custom is the cause of lameness in many instances. It is the first and most fruitful source of contraction in the feet, and it brings on this ruinous affection much more certainly than the hardest work. Horn has a natural tendency to contract towards heat wherever applied. The feet, it must be evident, are more hotly placed in litter than on the bare and moist ground, consequently the horn gains this additional stimulus to contraction. The litter keeps them dry as well as hot, and thus one of the best preventives of contraction, which is moisture, is not suffered to come near them. In my own stables no litter is ever suffered to remain under the fore feet during the day. The horses stand on the bare bricks, and which in summer are watered to make them more cool: by which simple means, I have experienced both prevention and cure. Behind, a little litter is strewed, because horses are apt to kick and break the bricks with their hinder feet, and because, when no gratings exist, or no slope is present, the litter thus placed sucks up the moisture of the urine, which would be detrimental to the hinder feet, which are more liable to thrushes than contraction. With regard to racks, I cannot recommend the general sloping principle in common use; the hay seeds are very apt to fall into the eyes, as I have seen in a great number of cases: hay racks should, on the contrary, be upright, and by no means so much elevated from the ground as they usually are, by which undue elevation the horse's neck is put continually on the stretch, tending to congest the blood within his head, and laying the foundation for many affections of it. It is evident that such a mode of eating is a total departure from the natural one, in which the horse seeks his food, and is therefore likely to be punished, in common with all artificial habits, by ill consequences.

A horse should always be brought into a stable with his skin nearly of the temperature of the stable. It is not generally known, though certainly it is the case, that passing from a cold atmosphere into a warm one will give cold, with almost as much certainty as removing from a warm into a cold situation. But when, unavoidably, a horse be brought home very hot, he should not be hung, as is often the case, by the bridle at the door till he get cold; he should, on the contrary, be walked till he has become cool. The legs, in very dirty weather, may be washed; but, unless they be rubbed dry afterwards, it would be far better not to wash them at all. In cases where fears are entertained on this head, it is a safer plan to rub off the loose dirt from the legs with a very soft broom, and then to wisp them till dry, after which it is proper to curry or rub off the remaining dust completely. The feet should, however, be always washed on a return from exercise, and carefully picked out. It is a most convenient appendage to a stable, to have a box, or large loose place; if the box be distinct from the stable, it will be so much the better. It should be so formed as to be capable of being cooled to nearly the temperature of the external air, or to be made as warm as may be requisite for some cases of sickness. No projections should be allowed in its walls to hurt the hips in cases of falling from weakness, staggers, &c. It should, also, have a grate in the centre communicating with an outer cesspool, with a general slight bearing of the flooring to the grating. The conveniences resulting from a loose box are innumerable. To a horse fresh from grass, to a sick horse, to a lame one, or to a fatigued one; in either, or all of them, it is of great importance and utility.

Stable Management.—This is also a subject of much importance. The duties of a master of horses is himself to superintend his groom, whose duties consist in *feeding, dressing, exercising,* and *attending to their feet;* in addition to which, he has the care of the appointments, as the *harness, saddles, bridles,* &c. I shall not at all interfere with him in any of these particulars further than regards the health of the animal; but on every thing that does concern the health, these sapient gentlemen must pardon me if I should differ from them.

The *feeding of horses* forms the most essential part of their treatment; and, from a non-observance of nature, and a want of consideration of the internal œconomy of the animal organs, more errors are committed in this essential matter than at first sight appear. In the food of horses we are apt to locate our notions to the matters around us, without considering that every country has its peculiar products, from some of which the materia dietetica of horses are gained. In some very sterile countries, horses are forced to subsist on dried fish; and in many others, animal matters are given as part of their dietetics—as milk in Arabia—flesh balls, eggs, broth, &c. in India, and other parts, where natural or accidental scarcity of proper esculent vegetable matter occurs. The food of horses may be divided into the natural and artificial, and also into the dry and the moist; but the various matters composing it are best examined by considering them under the leading heads of herbage, green and dry; grain, and varieties; which latter are composed of substances that embrace the principles of both these, as pulse, roots, fruits, mixtures, and cooked or partially digested food.

Of *herbage,* the principal is grass, of which an infinite number is known among agriculturists, many of which are eaten by horses either raw and moist, or in a dried state, as hay. Clover, rye, saintfoin, lucerne, vetches, or tares, are eaten and used either dry or moist in the same manner. Of these latter it is customary to form a stable food in their succulent or green state, which is called *soiling a horse,* and is found highly useful in cases of morbid condition, dry coughs, chronic affections of grease and farcy, &c. &c.; but great care is necessary in procuring it fresh, and to prevent its heating. In France, Spain, and Italy, leaves of various kinds, as vines, limes, &c. &c. are collected, and given both green and dry. In Holland, a particular reed flag is used in the same way. In Hungary, the dyer's wood (*isatis tinctoria*) is used for horses; and as it affords three or four crops a year, it may be always collected fresh and green. In many parts of the south of Europe, the leaves and smaller twigs of the acacia are likewise used as food for horses. In India, as the indigenous grasses mostly grow to an enormous height, and contain but little nutriment, so numerous vegetable substitutes are found, the principal of which are farinaceous. In many parts of the European continent, furze or whin is used, in districts where grass is scarce. It is found to form an excellent food, and cattle universally thrive on it. It is crushed for them, and, when it is not so done, by degrees the animals learn to do it for themselves with their feet.

Hay, or *dry herbage*, is made by cutting the various grasses or other vegetable matters during their fruiting and seeding processes, which being subjected to the action of the sun* and air a proper time, are then collected into large masses called ricks, where a certain degree of fermentation takes place before the matter is fitted to become wholesome or nutritious, or before it receives such alteration as fits it for resisting further decomposition and decay. The judicious management of this fermentative process forms one of the greatest desiderata in agriculture. Pursued to a proper extent, the remaining moisture acting on the farinaceous parts, as the seeds, &c. in conjunction with the heat evolved during the process, as it were malts the whole, and sugar is produced. Pushed beyond this, the hay becomes carbonized or mow-burnt, its nutritious properties are lessened, and its noxious qualities increased†. Many substitutes are used for hay. In our own country, wheat, barley, oat, rye, and other straws are used; but straw serves more to distend the stomach, and to mix with other matters, than to nourish alone. Horses will, however, when at rest, live on it. In some countries, dried fern, in others reed flags, dried leaves, small branches or twigs collected and dried, are used as substitutes for dried poa. In the West Indies the tops of the sugar-cane are stacked and used as hay; the straw of the Zea mays, or guinea corn, is also thus used.

The Grain used for horses are likewise of various kinds, and possess different degrees of nutriment, according as is supposed to their various proportions of gluten, sugar, and farinaceous matter: but a graduated scale of these compo-

* There is great reason to suppose that the aroma of the plants is dissipated by drying in the sun; and, as this aromatic oil forms a powerful stimulus to the stomach to digest the hardened substance, it would be better were hay (whenever it could be done) made in the shade. It would still further add to its qualities, if it could be made wholly without light also.

† Mr. Clark has argued, that as the scythe knows no distinctions, so, with the others, some noxious herbs are levelled; and to this cause he attributes some evils in feeding on hay: but surely the ingenuity here is greater than the probable truth. The same instinctive powers of selection enable the horse to refuse that which is noxious, whether green or dry, as we see by his wasting particular portions of his fodder, and which are always selected portions—for no other well-fed horse will eat them.

nents has not been found to throw a perfect light on their relative powers of animalization; nor can the laws and phenomena of organic life be ever found to be satisfactorily accounted for on chemical principles or inquiries. Grain seems peculiarly fitted for the support of those animals whose stomachs being small, muscular, and partly cuticular, approach the nature of the gizzard or food-pouch of the gallinaceous tribes. Such animals are hence called granivorous, in distinction to the graminivorous, or grass-eating, of which the horse family is the most prominent instance; and, although the vegetable stalk will furnish bare existence, yet it is from the nutritious qualities of the fruit or seed he is best supported. In South Britain, oats are almost exclusively used as horse grain. Sir Humphrey Davy has, by analization, supposed them to contain 748 parts of nutritious matter out of 1000: and it is probable the proportions are nearly so. Wheat, which he states by the same inquiries to contain 955 parts out of 1000, capable of animalization, must, according to him, afford much more nutriment; and it is probable that it does do so: but it is seldom used for such purposes, except on particular occasions, and then generally as bread, in which form it is a most convenient condensed medium of recruiting strength, and peculiarly adapted for horses which are tired, off their appetite, and whose digestions are weakened by over exertion. Barley is more frequently given to horses than wheat; and according to the experiments of Sir H. Davy, it contains 920 parts out of 1000 of nutriment: it is, therefore, if the laws of organized life exactly tally with chemical rules, more nutritious, though less used, than oats: made into bread, it is sometimes given, and still more frequently it is used in the form of malt, where its nutritious qualities are heightened by the sugar evolved. Barley appears to have been the principal ingredient in the horse food of the antients; and, on the continent, barley and straw are still very commonly given instead of oats and hay.

The pulses, as beans, peas, and vetches (the seeds), are sometimes given whole or ground, as horse farina. The former, which are most in use, are however seldom so given without some other material, as chaff, or bran, on account of their heating and astringent qualities. In the West Indies, maize, or guinea corn, is given to horses. In Holland, and many parts of Germany and Norway, buckwheat is made into a black bread with which horses are fed.

The varieties, as I have termed them, are such articles as, by their saccharine matter, prove highly nutritious, although their gluten is in small proportion. Carrots stand foremost on this list, and hardly too much can be said on their excellent qualities. They appear favourable to condition, as the skin and hair always look well under their use: they are highly nutritious, as we know from the fat accumulated when they are used; and so favourable are they to the free exercise of the lungs, that horses have been found to hunt on them alone, and, in conjunction with a certain portion of corn, perhaps they would form as good a food as could be devised for the severest work. In the *Museum Rusticum* is an account of two hunters fed with carrots and small loaves made of barley and oatmeal mixed: these horses were the pride of the field. Agricultural horses may be supported on them wholly, when sliced and mixed with chaff. The sweet parsnip has similar properties, and is also used with almost equal success. The Swedish turnip has proved also an excellent food of this kind; the sugar predominating in all these to an eminent degree. Potatoes have been also successfully tried as food for agricultural horses, but they have been usually given cooked. *Fruits,* as gourds and sweet potatoes, in America, figs and chesnuts in Spain and Italy, apples in some parts of France, and numerous other fructified exotics, are in use also as food for horses.

Mixtures, or *mixed food,* is formed of several kinds among agriculturists; and it possesses many advantages. It is economical—it can be varied to every taste, and also to almost every purpose, whether cooling as an alterative, or stimulating as a tonic. Although, as a general food, it is principally in use among farmers, post-masters, and waggon-keepers, yet it would be beneficial if its advantages were more widely extended. Among the mixtures which form what is called manger-feeding, one of the best is from a chaff composed of one part of the very best hay, and two parts of clean wheaten straw: to three bushels of this mixture add one bushel of bruised oats. It is of essential consequence that the oats be well bruised, not ground, but completely flattened by a proper machine made for the purpose. When whole oats are used, the grains are apt to slip between the chaff in mastication, and perhaps one half of it thus proves useless. If economy to the owners, and advantage to the animals, were generally studied, no corn would at any time be given without being ground. To horses under great exertion, the stomach must participate in the weakness of the whole, and such animals are often too much fatigued to masticate their food properly; but by bruising, the work is partly done for both organs. My experience among my own horses, and my inquiries among those to whom I have recommended the bruising all their corn, convinces me that one third is gained by the practice*.

* The good effects of bruising of oats are well exemplified in a letter from an intelligent officer in the India service to J. Curwen, Esq. M.P. published by him in his treatise on live stock. During a season of extreme scarcity in India, it was the custom of the famine-hunted wretches to follow the English camp, and to draw their principal subsistence from the grains

Of the mixed food I have described, three, four, five, or six pecks may be given daily, according to the size of the horse and the extent of his exertion. In this manger-feeding, little or no hay is requisite; by which means, horses who work hard are enabled to lie down and rest, instead of wearying their already tired limbs by standing through half a night to eat hay. Saddle horses of every description, except racers and hunters; and carriage horses of all kinds, may be fed on this mixture at one third less expense than by the ordinary method, and it will prove more wholesome and even more nutritious. I have exempted hunters and racers, not because with an increased quantity of corn they might not be as advantageously fed in this manner, particularly when not under immediate training, but because I shall startle the trainer and groom into complete defiance of the plan; whereas, by not asking for these, I may perhaps gain assent for the others. When chaff is used made of clover instead of meadow hay, it is more palatable to horses, and is thought more nutritious also. In many cases, nay, in most, carrots may be substituted for corn, provided the quantity be doubled or trebled, and this with additional advantage to the health and condition of the animals: but it should be always remembered, that the carrots must be sliced, and it is best that the slicing be thin and oblique, and then mixed with chaff (by which I never mean the useless hull of the oat, but cut wheat or barley straw, and particularly the former): ground barley is sometimes mixed with chaff, and more frequently ground beans also. These mixtures are largely used in farm stables, with benefit to the horses and to the owners.

Cooked food is now much used by practical agriculturists for horses, and some of them have given very favourable accounts of its advantages. The articles used are potatoes, turnips, carrots, and parsnips. To a weakened digestion, arising from very severe work, food in sufficient quantities, thus already reduced to chyme without the labour of mastication, or loss of much of the secreted saliva, may be very important; and, as Mr. Curwen has very judiciously remarked, the time gained for rest by the use of this food is a very important feature in the plan. A horse, he observes, will consume nearly six hours in eating a stone of hay, whereas he will eat a stone of steamed potatoes in twenty minutes. It is also in favour of this food, that horses are almost always found disposed to lie down soon after eating it; the reason of which appears to be, that the sudden distention of the

of corn extracted from the excrement of the horses. So little comminution do the grains suffer that do not pass under the teeth, that they vegetate afterwards readily. Some birds, we know, draw a great part of their subsistence from grain extracted from dung.

stomach disposes the horse, as it does all other animals, to sleep.

From the foregoing examination of this matter, it may be gained, that, by following the dictates of Nature as closely as circumstances will allow, we shall best fulfil her intentions in the preservation of the animals entrusted to our care: but it must not be overlooked, that art must also be counteracted by art; and, as luxury and commerce have introduced artificial habits and exertions, as well among our animals as ourselves, so these must be taken into the account. It is one thing to argue on the requisites to keep horses in health simply, and another to describe the processes by which they are to be enabled to undergo services to which, in a state of nature, they are never likely to be called. Commensurate with their exertion, therefore, must be the food, both in quantity and quality. If their work be simply laborious, it is all that is required that the food be sufficiently nutritious: the bulk whereby such nutriment is gained, is not a matter of import; but if such exertions are to be combined with celerity, as in our racers, hunters, &c. &c. it is evident that such feeding is best adapted to the end required which combines nutriment without bulk, and which increases the durability by giving tone, and courage by increasing the mental irritability, which are all found to be best derived from a proportionate allowance of grain, in preference to any other mode of feeding at present known. It remains only to add, that, although experience has fully proved this, in all cases where the exertions are extreme, yet it has also led to another evil, by introducing a plan of treating all horses of value alike. Thus, most of the more valuable hacknies, the carriage horses of the wealthy, &c. &c. are accustomed to be fed, not as though their exertions were moderate, but as though they were unceasing; to the great injury of themselves, and to the destruction of a vast quantity of valuable corn. To thousands of such horses at least one third of their hay might be advantageously abstracted, and one half of their corn; and which opinion is not lightly formed, but is the result of many years' observation, experiment, and inquiry.

Watering of horses is a part of their dietetics that is not of trifling import. All horses prefer soft water, and it proves more wholesome. So partial are they to it, that a muddy chalky pond is an irresistible stimulus to every horse. It is not a good custom to warm water generally for horses; but it is a much worse custom to give them water just drawn from a pump or well; and particularly in summer, when such water is, comparatively, colder than in winter, and when the horse is probably much hotter, from exercise, clothing, &c. As some horses drink quicker than others, it is more proper to give them their water in the stable than at a pond, where they often drink immoderately. The quantity given should be regulated by the exercise and other circumstances. In summer, and when the exercise has been severe, more is necessary. In common cases, a large horse requires rather more than the half of a large stable pail, and that twice in the day: at night a full pail should be allowed, making in all three waterings. It is erroneous to suppose that abstinence from water increases the wind or vigour; on the contrary, many diseases are encouraged, particularly inflammatory ones, by this deprivation. If it were the custom to place water within the reach of the animal, he would be found to drink more frequently, but less freely, than when watered according to the usual method. The restraint in this particular, when journeying, is barbarity itself, and is fatal to the appetite, to the spirit, and to the temper of the animal. Horses should never be galloped after drinking; it is the frequent cause of broken wind; nor should horses have much water given before eating: but on a journey, when the animal is very dry, give three or four quarts; then feed; and when that is partly eaten, some more, and afterwards the remainder of the quantity intended, which in hot weather should be liberal.

Dressing, or *grooming*.—The process of dressing is not my province to describe: it is better to be done without the stable, to avoid the injurious effects of the dust on the other horses, and on the food also, which may happen. The dandruff, or scurf, which is removed by the currycomb, is composed of phosphate of lime, and consequently it cannot be a very useful addition to the food, neither can it prove a very acceptable guest to the eyes of the other horses. In currying of horses, let me plead for the animals—let me hint to the groom, that, while he cannot bear the slightest touch under his arm, or at the bottom of his foot, or within his neck,—no, not from the sweet hand of the dairy-maid,—he should remember what some ticklish horses suffer under the currycomb. Let him then think of himself, and not mistake this miserable feeling for vice. Mild whisping with a hair cloth is all that is required for a fine-coated horse; and, in autumn, but little of this even is required. At all other times, friction is exercise, and therefore most salutary. The legs are always benefitted by this process, but, after fatiguing exercises, they are more particularly so.—There are three intentions answered by dressing horses: it cleans them from dust and dirt; it counteracts the artificial state of long continued rest and inactivity to which they are subjected by confinement, by exciting the circulation; and, lastly, it gives a beauty and sleekness to the coat. Grooms usually consider only the latter intention; and, as dressing requires much labour, they naturally resort to such means as produce a sleek smooth coat without the exertion; and this, experience tells them, is best effected by hot stables and heavy clothing. Idleness, in fact, has been a principal origin of this deviation from nature; but which, to give it a hold on the good opinion of their masters, grooms assert is intended to add to the health and useful qualities of a horse. To this they add another, and, if possible, greater evil, in a continued use of heating spicy matters under the name of cordials, by which the stomach is irritated to an undue sympathy with the skin and hair; and that is done by internal as well as external heat, which would be as readily effected (as respects the appearance of the animal, and infinitely more so as regards his strength and non-liability to disease) by moderate heat, regular exercise, and long continued friction. Friction is equally beneficial with a brush as a currycomb; and to a very delicate skin, or in autumn when the coat is always thin, and about to change, it is much more so. To the legs, friction is of peculiar importance; they should be well rubbed by the groom on his knees, having a wisp of straw in both hands, and the leg between the two. The dressing of horses is certainly not only a salutary but a necessary part of their treatment; it should nevertheless be practised more mildly than it usually is by the generality of grooms and ostlers.

The Feet.—The feet are always an object of particular attention with every prudent horseman, and every careful groom. Every morning the feet should be picked and examined, to observe whether the shoes be fast; what state they may be in; whether the clenches be not raised, so as to cut the horse, and that the heels of the shoe do not press on the foot. Where the feet grow fast, the shoes ought to be removed once in three weeks, whether they be worn out or not. A want of attention to this particular is the ruin of many horses; ignorant grooms supposing, that, because the shoes are yet good, the hoof wants no alteration: the moment a foot becomes too high, it begins to contract. In hot weather, particularly when the feet are naturally dry and hard, they should be stopped every night: clay stopping, by getting hard and dry, is not good; cow dung, or even horse dung, is a much better one, and it is rendered still more so, if a small quantity of tar be put into it. If the hoofs become brittle, not only stop them, but dress them throughout the upper surface with the softening mixture directed among stoppings in the *Materia Medica*. Let all the litter be moved from under the fore feet the first thing in the morning; and if such feet should be naturally of the hard, dry kind, or shew any tendency to contract, wet that part of the stall with water, and wrap also some thick pieces of cloth around the hoof, dipped in water.

Carefully pick the feet after exercise; without this examination, a stone may press on the sole, or a nail may remain inserted in the frog, to the ruin of the animal. Inquire of the smith the convenient time for a horse to be shod: horses sometimes remain many hours in a cold shop, exposed to the tricks or brutality of persons around; but by suiting this operation to the convenience of the smith, it can be attended to immediately. After a long journey, it is a very good plan to pull off the shoes, and turn the horse into a loose place with plenty of litter under him. It recovers the feet very fast; for horses suffer, like ourselves, from tender-heated feet in summer, or after long exercise, when no real disease exists in them beyond the tumefaction occasioned by fatigue.

The Appointments of the Horse.

In attending to these, some things are essential to the health of the horse, others only so to the appointments themselves; with these I profess not to interfere. Of the former kind, is the airing of every thing belonging to him thoroughly, and which is more important than may be at first imagined. When a horse comes in hot from a journey, his saddle must have absorbed a large quantity of moisture: without care, this must remain damp; and if put on in this state the next day, it will very frequently give cold: the same often happens from the body-clothes, and even from the girths. Horse cloths may be considered by some as necessary to keep the animals from draughts of air, and from the access of dust to their coats; but in this, as in the stables, grooms err in point of heat, for their horses are almost always too much clothed. If horses must have this unnatural incumbrance, a single linen sheet is fully sufficient in summer; and in winter, the same, or at most one woollen cloth only, is all that is requisite. Neither hacks nor hunters should wear head clothes in the stable; and breast clothes, though they may be thought ornamental, are worse than useless, for they keep a part warm while at rest, which, as soon as the horse goes out, is the one most exposed to the action of wind and rain. If these were worn on some occasions of mere walking exercise, particularly in very bleak cold weather, the practice would be much more consistent and proper than in the stable.

EXERCISE.

Nothing is so convincing a proof of the necessity of exercise to animals as their love of play in a state of nature; from which natural act we likewise infer, that it is much more necessary to the young and to the robust than to the old and weakly: this remark should influence our domestic management of horses. We confine our horses not only to have them at our immediate call, but to bring them into particular states, which are artificial. Both commerce and luxury have united to produce this close keeping; and nature, to keep pace with it, has introduced numerous diseases, unknown in a state of nature; and which it is our duty to counteract as much as lies in our power by regular and judicious exercise, when the ordinary work of the animal does not supply it.

Commerce and luxury have not only taught us to confine our horses, but they have forced us also to the artificial system of high and luxurious feeding, to supply an unnatural quantity of irritability (commonly called courage and spirit), to continue the unnatural exertions frequently required of them. High feeding, therefore, has its share also in giving a tendency to disease, but which these continued exertions counteract, and, as long as they are so continued, horses do not materially suffer; but there are times when we do not want to employ them, and yet we wish to keep them in a state to be able to do it when we do want their exertions: and it is at this time they frequently suffer; for the necessity of exercise proportioned to their food is not sufficiently considered, or the time cannot be spared, or servants neglect them; and thus the horse becomes pursive, that is, he accumulates fat, his legs swell, his heels crack, and at length become greasy; all which must necessarily be the case: for the receipts of the constitution being great by the high feeding, so the outgoings, by perspiration, &c. &c. ought to be large likewise; and it follows that, if the secretions do not find their natural vents, they will find themselves artificial ones.

The muscles are composed of fibres, having a contractile power, by which all the motions of the body are performed. These fibres act best when they are placed parallel, or in a right line to each other; but it is not always that they are so placed. Every one has seen beef, where the fleshy fibres (which form the muscles of the ox) were so interspersed with fat, as to throw these fibres out of their rectilinear course. It must be just the same with fat horses; and their muscles, therefore, having their fibres separated from each other by the fat, cannot at these times act to advantage, or with their due force. The absorbents of the body are acted on by various stimuli. *Exercise* is one of the strongest of these, and by its means fat horses are made lean: when it is only ordinate, and in due proportion, it does not emaciate the animal by wholly removing the adeps; it merely takes it up from the interstices of the muscles, and places it where there is less pressure; so that the horse, if well fed, still continues lusty, but the fat becomes more advantageously disposed of. *Exercise* enlarges the muscles, for Nature endeavours to become equal to her wants; therefore, when horses or dogs are trained for hunting or racing, they should have regular and long continued exercise. *Exercise* improves the wind, by promoting an absorption of the surrounding fat from the viscera of the chest, and thus allowing the lungs to expand: it also enlarges the air cells of the lungs themselves; and hence, by imbibing more air, the animal can remain longer between his inspirations.

To give rules as to what quantity of exertion is necessary, we should know exactly what are the age, constitution, and mode of feeding. A young horse requires more exercise than an old one; but, if he be very young, it must then be neither very fatiguing nor very long continued. Some colts are observed to come out of the hands of the breaker with windgalls or splents, from extreme and long-continued exercise. A full-fed horse should have his exercise continued for a considerable time: if it be given once a day only, not less than an hour and a half or two hours is requisite; if twice a day, which is most natural and proper, it may be an hour each time. Horses exercising should be first walked a considerable way; they then may be gently trotted, and, if intended for hunting or racing, they may be also moderately galloped: but under any circumstance, the exercise should finish with a walk of sufficient length to bring the horse in cool and inirritable from the vivifying effects of arduous exertion. More is dependent on this than is usually taken into account: when a horse returns vivid and fiery, it is ten to one but he and the groom quarrel. It is evidently not my intention to offer any instruction relative to what is called *training;* I am only speaking of exercise as necessary for health. Many valuable horses are spoiled by servants exercising them. It is not unusual with these gentry to gallop their horses against each other; and a horse frequently gets more severe exercise in one hour's work with the servant, than in a week's riding of the master's: to prevent this, horses should either be exercised within sight of the house, or on some road where they may be now and then seen by some one interested in the management. This galloping against time, or against each other, produces heat and thirst in both horses and grooms: the latter, to slake their own, resort to the public house, where half an hour is spent in drinking, and that while the shivering animals stand at the door: the time now lost must be made up by another gallop, and the horses are returned to their stable in a profuse perspiration, by which they frequently contract serious indisposition; and which is still more likely to happen, if, as is frequently the case, they should be washed with cold water, and permitted to dry at leisure; and which it may be observed is always a bad custom, for the heat and moisture united encourage a determination of blood to the legs, and occasion swelling, and often grease. A horse, therefore, should be brought home after his exercise as cool as possible, and, if washed, he should be carefully rubbed dry. Friction itself may be considered as a species of artificial exercise, and as the best substitute for it; and whenever, therefore, circumstances prevent exercise, as frosts, lameness, &c. &c. a greater share of hand-rubbing should be made use of.

As the prevention of disease is better than the cure, so it is greatly to our interest to attend to stable management in all the particulars detailed. By frequenting their stables, masters become interested in the personal comfort of their horses, and a new pleasure opens itself to them. Nor are the horses themselves unmindful of this, but amply repay such attention by becoming personally attached to such masters, and much more willing and obedient to them. This is exemplified in borrowed horses, which, though enjoying and deserving the reputation of excellent, are frequently found by the borrower sluggish, wilful, and often vicious.

PART THE SECOND.

THE

Anatomy of the Horse;

OR,

A DESCRIPTION

OF

THE STRUCTURE, FUNCTIONS, AND ECONOMY,

OF

All the Parts of his Body.

Sect. VIII.

THE ANATOMY OF THE HORSE.

ANATOMY teaches the structure, functions, and economy of the various parts of the animal frame. It appears both convenient and systematic to consider it under the several heads of

Osteology		Bones
Syndesmology		Ligaments
Myology		Muscles
Bursalogy		Mucous Capsules
Angiology	or the doctrine of the	Vessels
Neurology		Nerves
Andenology		Glands
Splanchnology		Viscera
Hygrology		Fluids.

In the following detail, I have, throughout, blended the functions of the parts with their formation; the one illustrating the other, and both being essential to the art it is proposed to teach.

OSTEOLOGY.

BONES are hard, white, insensible bodies, upon which the soft parts are laid and sustained; thus they form the base of the animal machine. They are composed of earth, cartilage, and membrane*. The membrane appears first formed, into which cartilage is deposited to produce some solidity: gradually the arteries pour out within the centre of each bone the *earthy matter*, until the whole is completely consolidated. This consolidation does not take place in all the bones until the full growth of the animal; neither are the stages of osseous evolution alike in each bone, those becoming soonest ossified whose use could be least dispensed with; and thus, also, the evolution of the bones in the indigent tribes, as kittens, puppies, &c. is less perfect at birth than in the foal, lamb, calf, or others, who have to make exertions as soon as born. It is to this delay in the complete evolution of each bone that we cannot make a perfect skeleton of any young animal, the ends of the bones being at this time only cartilaginous, and separating from the bodies by maceration. The deposit of earthy matter, and the consequent consolidation of the bones, appears to be hastened by any thing that permanently quickens the circulation, by occasioning a more speedy separation of the earthy parts from the blood; and thus nature gives to young animals a playful disposition, which increasing the flow

* Mr. Howship has shewn that bones are first formed by two membranes, a periosteal and a medullary; within which, cartilage is continually deposited, until the whole becomes consolidated: gradually, however, the cartilage becomes absorbed, and earth is placed in its room.

of blood, occasions a more free deposit of the earthy particles: hence, likewise, the inhabitants of warm climates come to perfection sooner than those of the northern regions. By preternaturally hastening the earthy deposit before the membranous part of the bone becomes fully evolved, it is evident, that though such bones may be consolidated more early, yet they will not attain their natural size; that is, that by this means the growth becomes checked. Thus we learn the reason why horses early and hard worked never arrive at their full size. Pressure likewise appears to assist ossification; thus, parts long exposed to it, as the cartilaginous ends of the spinous processes of the vertebræ, ossify from the pressure of the saddle or heavy burdens. To unnatural pressure we also attribute the *putting out* of splents and spavins in young horses, too early and too hard worked.

The earth of bones is continually changing, and fresh is deposited in its room: this change is effected by their absorbing vessels. In some instances the absorption appears to be greater than the deposit, which occasions the disease termed rickets, which, though not frequent among horses, is now and then to be met with. I have more than once seen foals born with crooked legs: in puppies it is by no means uncommon. The earthy deposit is usually proportioned to the wants of the animal; it is thus most perfect in those whose exertions are the most considerable: in the full bred horse, therefore, the bones will be found more solid than in the bulky lower bred varieties. The cavernous part of a bone is lined by a membrane, called the *internal periosteum,* intended to retain the *medulla* or *marrow,* which is an oily fluid poured into the cells of this membrane, and is secreted from the large blood vessels that enter the bones by foramina. The bones have also an *external periosteum,* or outer covering (see *Syndesmology*). From what has been said, it is evident that bones are cavernous, or hollow, by which they are not only rendered lighter, but stronger also. Bones, though furnished with nerves, have little sensibility, except under inflammation, to which they are very liable in the horse; at least to that kind which produces exostosis. The varieties in the form of bones have occasioned their division into cylindrical, flat, spherical, and irregular; but whatever their form, they are all furnished with cavities and eminences. The cavities are glenæ, or narrow and shallow; cotylæ, or deep and wide: they have, also, pits, furrows, notches, fossæ, sinuses, foraminæ, &c. The eminences are epiphyses, whose use is often to increase the surface of attachment of tendons, or to remove their axes farther from the centre of motion. Apophyses are parts added to a large bone. Processes are, a caput, or head, or a cervix or neck. A rough process is a tuberosity, and others are called mastoid, styloid, &c.; such as form brims are called supercilia, &c. &c. Bones articulate with each other either by diarthrosis, or separated articulation; or by synarthrosis, or conjoined articulation. Symphysis is a species of articulation which takes place through the medium of another body, as cartilage, ligament, &c.

Description of Plate I.

Head.

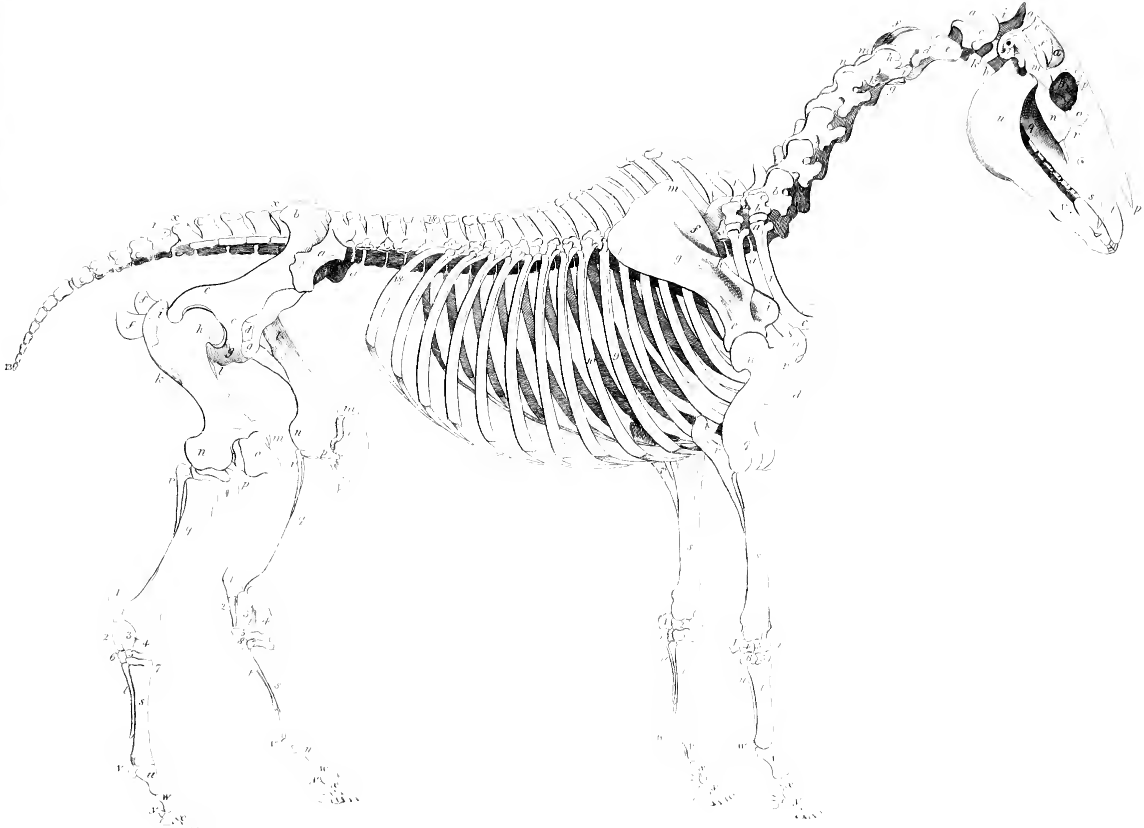
a, *b*, *c*, *d*, os frontis. Only one can be seen, the suture dividing them, which is the sagittal, is exactly in front of the head; *a*, the coronal suture; between *a* and *b*, the orbitar apophysis, with the superciliary foramen on it; *b*, the portion of the frontal forming the orbit; *d*, the portion uniting it with the malar and palatine bones; *e*, *f*, parietal bone; *e*, its junction with the occipital by the lambdoidal suture; *g*, *h*, *i*, *k*, occipital bone; *g*, occipital protuberance; *h*, its cuneiform process; *i*, the condyloid process received into atlas; *k*, the pteregoid process which is peculiar to the horse. *l*, *m*, Temporal bone, the squamous portion is seen just above the zygomatic arch; joined to the parietal by the squamous suture; *l*, the petrous portion forming the internal ear; *m*, the zygomatic process forming the zygomatic arch, seen uniting with the orbitary process of the frontal, and the zygomatic process of the malar by two sutures; *n*, malar, jugal, or cheek bones; the dark line immediately under, is the spine, which is continued into the maxillary; *o*, os unguis, *p*, *p*, nasal bones; *q*, *r*, *f*, superior maxillary; *q*, the portion uniting with the malar and palatine bones; *r*, that uniting with the malar and angular; the triangular space shews a portion of bone that is sometimes formed between, called os triquetra; *f*, the inferior portion uniting the inferior maxillary; between *r* and *f*, is seen the superior maxillary canal. *t*, the inferior maxillary bone; *u*, *v*, *l*, *m*, maxilla posterior, or lower jaw; *u*, the branches; *v*, posterior maxillary canal; *m*, above this and below; *f*, the coronoid process passing under the zygomatic arch.

Vertebræ.

a, *b*, the seven cervical vertebræ; *a*, the atlas; *d*, *e*, *f*, dentata or second; *d*, its single transverse process; *e*, its upper oblique process; *f*, its ridge answering for a spinous process; *g*, *h*, *i*, *k*, *l*, *m*, *n*, third cervical vertebra; *g*, its body; above the letter is the hole for the transmission of the vertebral arteries and veins; *i*, *k*, anterior and posterior transverse processes; between *h* and *i*, is a hole through which the cervical nerves pass; *l*, anterior protuberance in the body; *m*, the spinous process; *h*, the upper oblique processes; *n*, the lower oblique processes; 1, 18 marks, the 18 dorsal vertebræ; *a*, the body; the space between each is filled by a cartilago ligamentous substance; *b*, the transverse processes articulating with the head of each rib; *c*, their upper oblique processes; *d*, their lower ditto. 1, 5, the five dorsal vertebræ, their transverse processes are very long, but by the fore shortening in the perspective, are not very evident in the plate; *x*, *x*, the sacrum composed of five pieces; the spinous processes are the only parts distinct; the transverse are united into one unequal rough part; 1, 13, the coccygis or bones of the tail; the spinous and transverse processes are distinct only on the first four or five.

Sternum, Ribs, Shoulder, and anterior Extremities.

a, *b*, 1, 9, the true ribs; 10, 18, the false ribs; *a*, the head articulating with the transverse process of first dorsal vertebra; under is seen the lower branch of the head that unites with the seventh cervical and first dorsal vertebra; *c*, the end that unites with the sternum; *d*, the sternum; *e*, *f*, *g*, *h*, *i*, *l*, *m*, the scapula, *e*, its neck, below which is seen its glenoid cavity; *f*, antea spinatus fossa; *h*, its spine, which in the human ends in the processus acromion, but as there is no clavicle in the horse it ends by a tuberosity; *i*, coracoid process; between *m*, and *i*, the anterior costa; *l*, between this and *e*, posterior costa; between *m* and 1, is its base, and the line above it marks the extent and



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situation of the cartilage of the scapula; *n, o, p, q*, humerus or arm, *n*, its cervix, above which is seen its head; *o*, its anterior head, forming the point of the shoulder, as it is usually called, in the horse; *p*, its tuberosity; *q*, its lower head, behind is seen the cavity for the reception of the olecranon; *r, r*, ulna; the upper part forms the olecranon or elbow; the lower part is united by ligamentous fibres to the radius; *f, f*, the radius; 1, 2, 3, 3, 4, 5, 6, 7, the carpus or knee; 1, 1, pisiform; 2, 2, scaphoid; 3, 3, lunare; 4, cuneiform; 5, magnum; 6, unciform; 7, trapezoid; *t, u*, metacarpus; *t*, canon; *u*, two small metacarpals; *v, w, x, y, z*, phalanges; *v*, first phalange or pastern; *w*, sessamoids; *x*, coronet bone, or little pastern; *y*, coffin; *z*, navicular or nut bone.

Pelvis and posterior Limbs.

a, b, c, d, e, f, g, the two ossa innominata; *a, b, c*, ilium; *a*, tuberosity of ilium, forming the haunch or hip; *c*, the union with ischium; *e, f*, ischium; *g, g*, pubis; and between the letters, the symphysis; *d*, foramen thyroideum; *h, i, k, l, m*, femur or thigh bone; *h*, the cervix, above which is the head received into the acetabulum of the pelvis; *i*, great trochanter; *k*, the outer trochanter; *l, l*, the inner trochanter; *m, m*, the anterior condyles; *n, n*, the posterior ditto; *p, p*, semilunar cartilages; *o, o*, patella; *q*, tibia or leg, commonly called the thigh; *r*, *fibula;* the tibia is seen terminating in its maleoli, to articulate with the tarsus; 1, 2, 3, 4, 5, 6, 7, 8, tarsus or hock, 1, 2, 1, 2 calcis, forming the point of hock, in man the heel; 3, 4, astragalus; 5, 5, cuneiform magnum; 6, cuboides; 7, cuneiform medium; 8, cuneiform parvum. *f, f*; *t, t*, metatarsus; *f, f*, canon or shank; *t, t*, two small metatarsals; *u*, pastern; *v*, sessamoids; *w*, coronet bone or lesser pastern; *x, x*, coffin; *y*, nut or navicular.

BONES OF THE HEAD.

The Cranium, or Skull.

THE bones of the head are those of the skull, face, and posterior jaw; and the juncture of most of these is effected by *sutures,* which in the ruminants are more marked than in the horse. The skull is a vaulted cavity for the reception and preservation of the brain, and is composed as follows:—

The *frontal* bones *(ossa frontis),* as they unite by age, are frequently, but erroneously, described as a single bone. They are situated in the front of the head *(a, b, c, d, Plate* I), and receive and lodge the anterior and inferior portion of the brain. The two tables of which they are composed separate to form two cavities, called the *frontal sinuses**. The frontals are united together by a continuation of the *sagittal suture;* laterally they are connected to the malar bones by the *orbitary process,* forming the *zygomatic suture;* inferiorly to the nasal bones, and interiorly to the ethmoid and sphenoid. The orbitar process forms the *greater orbitar fossa,* or cavity over the eye†;

* These cavities La Fosse directs to be opened, in his treatment of glanders, by the trepan. They are sometimes found filled with worms, particularly in oxen and sheep, *astrus sinus frontis ruminantium.*

† It was formerly supposed impracticable to perform the operations of couching and extracting the eye of the horse, from the great strength of the retractor muscle; but by making an opening under this process the globe may be secured, and either operation performed. The real impracticability of ob-

in which process *(see plate of skeleton between* a *and* b, *bones of head)* is seen a nitch or hole, called the *superciliary foramen,* giving passage to a branch of the fifth pair of nerves and to the blood-vessels, furnishing the supercilia and parts adjacent.

The *parietal* bones *(ossa parietalia)*, which are square-like, are placed between the temporal, frontal, and occipital bones: they unite together by the *sagittal* suture, to the frontal by the *coronal,* and laterally to the temporal by the *squamous* suture. In the ox and sheep the *ossa parietalia* are united into one bone.

The *temporal* bones *(ossa temporum)* are divided into two portions, a squamous and a petrous, which in the horse remain always distinct*. Considered, as they usually are, as one pair of bones, each has a single cavity, very irregular in figure, and uniting with all the bones of the skull but the ethmoid. The *squamous portion* is joined to the parietal by the squamous suture, and has a large peculiar process, called the *zygomatic,* which contributes, with a lesser one of the malar bone, to form the *zygoma,* or *arch of the cheek:* nearly at the root of this process is a protuberant cartilaginous cavity, articulating with and receiving the condyloid process of the lower jaw. Within the *petrous portion,* which is situated at the root of the outer ear, is a distinct cavity to each, forming the bony hollow called the internal ear.

The *sphenoid (os sphenoides)* is a very irregular bone, and connected with all those we have described, to which it is, as it were, a key. It presents several processes, as its *alæ* or *wings;* its *orbitar apophyses;* and likewise its *cuneiform, occipital,* and *temporal processes.* It has within its body a cavity, called the *sphenoidal sinus,* which communicates with the ethmoidal cells. It is connected to the cuneiform process of the occipital, superiorly and posteriorly to the ethmoid and the vomer; inferiorly and posteriorly to the squamous portions of the temporal, and to part of the palatine bone.

The *ethmoid (os ethmoides)* of the horse forms a very considerable bone, which, from an intermediate plate or septum, called *christa galli,* has been described as two: it is situated under the superior part of the nasal fossæ, between the frontal and sphenoidal bones, and is made up of numerous cells of very irregular figures and direction, which are all lined with the pituitary membrane, and communicate with the frontal sinuses, terminating in the anterior turbinated bones†. The *sella tur-*

taining a successful issue, arises from the derangement of the internal parts of the eye, as well as from the imperfect vision that would be gained by the removal of the opaque lens.

* Mr. Stubbs, misled by anatomical analogy between the human and the horse, has described these as united portions.

† These cells are filled with purulent matter in *glanders;* and in the *distemper* of dogs they are so likewise, when it is very virulent.

sica, a cavity lodging the pituitary gland, which in the human is in the sphenoid, in the horse forms a part of this bone: its orbitary process likewise forms the superior optic foramen, which in the human subject is formed by the sphenoid.

The *occipital (os occipitis)*, called by farriers the knoll bone, differs widely from the same bone in the human, both in figure and situation. In the young subject it is composed of two pieces, but in the adult of one. It is situated at the summit of the head (*vide g, h, i, k, Plate* I), and is the largest of the bones of the skull, articulating with the parietals by the *lambdoidal suture,* to the temporals by their petrous portion, and by its cuneiform process to the sphenoid bone. It rises superiorly into a ridge, or perpendicular process, to which the cervical ligament of the neck is attached; and its inferior surface presents several processes and eminences, two of which, arising from the posterior part of the bone, are peculiar to the horse, or at least do not exist in the human: they have been called styloid, but are more properly the *pteregoid processes* (*vide k, Plate* I). The *condyloid apophyses* articulate with the atlas; and its *cuneiform process,* which is very large (*vide h, Plate* I), is received as a wedge among the bones of the skull. Its principal cavities are the *foramen magnum,* giving passage to the spinal marrow, and the *condyloid foramina,* penetrating the condyloid apophyses. In the horse, the foramen magnum is found at the posterior aspect of the skull*.

The *nasal* bones (*ossa nasi; vide p, Plate* I) are united together throughout their. whole length; which union internally forms a groove, receiving the cartilaginous *septum narium.* They are connected interiorly with the anterior turbinated bones; superiorly with the frontals; superiorly and laterally with the angulars; and inferiorly with the lower maxillary. The *nasal fossæ* are formed of these bones, in conjunction with the maxillaries laterally; superiorly of the posterior table of the frontals, forming the frontal sinuses, with which they communicate; and posteriorly of the palatine bones, and which fossæ are the principal seat of glanders.

The *angulars,* or *ossa unguis,* are in the horse wholly ossified, and situated at the inner angle of the eyes (*vide o, Plate* I), forming a considerable portion of the orbits. Each is nearly square, and joined to the nasal, malar, frontal, and superior maxillary; and is so formed as to present an inner, outer, and

* It is exactly at the posterior part of this bone that the disease called pole evil takes place, and which usually commences by an injury done to the integuments, and sometimes to the ligaments also; from whence, in bad cases, it proceeds to the mucous capsule of the bone, and lastly to the bone itself. This bone has been known to be fractured by a violent effort: such a case occurred in the Strand, where on a frosty morning a horse fell, after many violent exertions to save himself: when he reached the ground, he died almost immediately. On examination, the occipital bone was found to be divided into three or four pieces.

orbitary surface: between the outer and orbitary surfaces, is the orbitary ridge, and the latter of these surfaces is perforated by a canal, just within the inner angle of the eye, forming the *lachrymal duct*, or *ductus ad nasum*, carrying off the superfluous tears into the nose. This duct passes bony between the turbinated bones, and then becomes membranous under the inferior or posterior of them.

The *malar, jugal*, or *cheek* bones (*ossa malarum*), occupy the posterior part of the orbits (*vide n, Plate* I), between the angular, superior maxillary, and temporal bones; to the last of which each is united by its temporal process, which forms part of the zygomatic arch.

The *superior maxillary* bones (*ossa maxillaria superiora*) are the largest of those particularly belonging to the face, and are connected anteriorly to the nasal; inferiorly to the inferior maxillary; and internally to each other, and to the palatine by their palatine processes: they are connected also to the vomer, and within the orbit to the zygomatic process of the temporal bones. Their exterior surface is convex, and has upon it the maxillary spine continued from the malar: midway between this and the junction with the nasal bone, there is a foramen called the *anterior maxillary canal*, which is continued through each of them, and transmits the second branch of the fifth pair of nerves, with some vessels; all which go to supply the molar teeth: its inferior edge is pierced by the molar alveoli. By their junction with each other posteriorly, these bones form the inferior portion of the palatine arch, or roof of the mouth; the superior part of which arch is formed by the palatine bones themselves, to which the maxillary are united. At the inferior portion of this arch, these bones recede, as it were, to give place to a pair of bony plates, which, as they appear in a great measure distinct, should be called, I think, inferior palatines. The cavities formed by the internal surface of each of the maxillary bones lodges the turbinated bones, with which the anterior of them is nearly filled; therefore, part of what has been described by authors as maxillary sinuses, and so often mentioned as such by La Fosse, might as properly be called *the turbinated*. (*Vide q, r, s, Plate* I.)

The *inferior maxillary* bones (*ossa maxillaria inferiora*) have been frequently considered as parts of those last described, although the division between them is as evident as that between the frontals and parietals*. Mr. Stubbs falls into the same error. These bones are wanting in the human, and are peculiar to animals with long jaws; they unite together by

* Blumenbach terms it the *intermaxillary*: and as it is not found in man, he considered it as a distinctive mark between the human and brute subjects. It is, however, found that no such bone exists in some of the long-tailed monkies, although it is present in some of the short-tailed tribes: such distinction, therefore, is fallacious.

symphysis, and to the inferior maxillary and nasal bones by the suture, called harmony. They concur in forming part of the nasal fossæ, and at their inferior edge have six *alveoli*, lodging the anterior incisive teeth. The tush is now and then lodged in the posterior edge of this bone, but generally in that of the superior maxillary. At the symphysis is a foramen, giving passage to blood-vessels and a nerve. (*Vide t, Skel.*)

The *superior palatines* (*ossa palati superiora*) are situated at the upper part of the bony palate, beyond the superior maxillary, to which they unite, and jointly form the arch of the palate: superiorly, they unite to the wings of the sphenoid, and leave an oval opening between them and its body, which forms the entrance of the nasal fossa into the pharynx.

Os triquatra (vid. o, r). It is not uncommon to find a triangular portion of bony plate interposed between the unguis, superior maxillary and the nasal bones. In oxen and sheep it is seldom met with.

The *inferior palatine* bones (*ossa palati inferiora*), although I think sufficiently distinct from the superior maxillaries, are often described, and considered as the same. They are small frangible plates; usually situated between two receding portions of the superior maxillaries, but now and then their inferior part is received between similar portions of the inferior maxillaries.

The *pteregoid (ossa pteregoides)* are two small crooked bones, about which likewise authors differ. Bourgelat considers them as portions of the palatine bones; by others they are described as their styloid processes: but they may be regarded as detached distinct bony portions, situated between the vomer and palatines, forming a cartilaginous ring, through which passes the tendon of a muscle of the palate.

The *anterior turbinated* bones (*ossa turbinata anteriora)* are thin, bony lamellæ, that occupy part of the space formed by the cavity within each superior maxillary bone. They are connected with the nasal bones, and receive the continuation of the ethmoidal cells, and are seen, on opening the nostrils, forming a species of tortuous cavity.

The *posterior turbinated* bones (*ossa turbinata posteriora*) occupy the remainder of the cavity of the maxillary bones, and by their mutual tortuosities have been called by the French the inferior cornets of the nose, as the anterior are called the superior cornets. The turbinated bones are very spongy, and slight in their texture, being sieve-like, and have sometimes in glanders become absorbed: they increase the surface of the pituitary membrane, which is the reason they are so considerable in brutes, and so trivial in man*.

* Some discrepancy often arises in the description of the maxillary cavities, from their intimate connection with these bones. By considering the maxillary sinuses as an anterior and posterior, of which the latter is the

The *vomer*, or ploughshare, extends from the inferior part of the nasal fossæ, so as to divide, in conjunction with the cartilaginous septum, the nostrils into two equal cavities; superiorly it joins the sphenoid, and inferiorly is received into a groove of the palatine process of the maxillary bone; it is likewise connected with the ethmoid.

The *posterior maxillary* bone (*maxilla inferior*), or *lower jaw*, is in the fœtus composed of two pieces, afterwards intimately united by symphysis at the chin. The anterior edge, by a separation of its tables, forms the *alveoli* for the reception of the molares or grinders, the tushes, and incisive teeth. The inner surface presents a foramen, called the *posterior maxillary canal*, which gives a passage to the third branch of the fifth pair of nerves, and to an artery and vein, which furnish the teeth with nourishment. The inferior part of the anterior edge forms the *bars* on which the bit rests. At the superior portion, this bone on each side turns up into two considerable branches; the external angle of each of which is the thickest of the whole, and is called the tuberosity; the branches themselves end in two processes with an intermediate groove. The first and most superior of these, is called the *condyloid process*, and forms a flat head tipped with cartilage which articulates with a cartilaginous depression of the zygomatic process of the temporal bone (see *Skel.*); between which articulations is placed, as in the human, a moveable cartilage, accommodating itself by its figure to the motions of the jaw. The second is the *coronoid process*, and is flat, passing under the zygomatic arch (*vide f and m, Skel.*), and having the crotaphite muscle inserted into it. From this, the use of this arch becomes evident; for were it not for this guard, every accidental pressure, and every slight injury, would impede the motion of the jaw, and starve the animal. The whole likewise of this bone shews the most admirable mechanism: the molar teeth, on whom most is dependant, and whose exertions are greatest, are placed immediately under the actions of very powerful muscles: and as the upper jaw in most animals is nearly fixed, so it was necessary in the horse, and other graminivora, that the lower should have considerable extent of moving power for the purpose of a grinding process, and it is accordingly so formed as to admit of motion in every direction*. The condyloid process is attached to the temporal bone by a

larger, and forms a projection within the nasal cavities, the true nature and number of the cavities will be gained.

* A mere inspection of the articulation of a brute jaw separated from the body would enable a naturalist to determine whether it belonged to a carnivorous or herbivorous animal. When the articulation is so formed as to admit of vertical motion only, it may safely be determined to belong to one of the carnivora; but when it appears endowed with both vertical and horizontal motion, it will be found to have formed a part of an animal of the herbivorous order.

ligament (which inserts itself behind the zygomatic process), as well as by a large capsular ligament: the coronoid process, on the contrary, is attached by means of the crotaphite tendon. Had this been a ligament as well as the former, the mouth could not have been opened sufficiently, as in the act of gaping, &c. and without this additional attachment, the condyloid articulation would not have been sufficiently strong.

The *os hyoides* is composed of five bony pieces, which are so distinct, that it has been by some described as five bones. It is situated at the root of the tongue, and articulates with the skull by means of the temporal bone; by which it is rendered very useful as an attachment to the muscles of the tongue, as well as to those of the larynx and pharynx. (*Vide i, i, Plate III, fig.* 2.) It is divided into a body, two larger, and two lesser branches. The body forms a species of cross, that articulates with the first cartilage of the larynx, and then gives an appendix pointing towards the teeth, to which the tongue is attached. On each side of this are the lesser branches uniting with the body by a moveable articulation, and to these the larger branches unite by an acute angle, and enlarging, extend up into the head, within the membranous cavity of the eustachian tube. (*Vide d, fig.* 1, *Plate III.*)

Description of the Teeth.

The *teeth,* the hardest and most compact bones of the body, are situated in cavities between the tables of the jaw bones, called *alveoli:* there are usually forty in the horse (and thirty-six in the mare), the latter commonly wanting the *tusks,* or tushes. They are divided into *incisores, cuspidati,* and *molares,* or, as they are called by farriers and horsemen, *nippers, tushes,* and *grinders.* Each tooth is formed of a crown, neck, and root. The crown is the upper part, and is variously formed in the different teeth; the neck is not very evident in the adult horse, but is more distinct in the colt. The roots are received into the alveoli in a conical form, and are not spread out into distinct fangs as in the human. The teeth are composed of an osseous part of the nature of *common bone;* of a compact shining portion of extreme hardness and durability, called *enamel,* and which is not simply spread over their outer surfaces as in the human, but enters within their substance in the horse. A third substance also enters their composition, called the *crusta petrosa.* This latter is principally spread over the incisor teeth at a young period of their growth, but some of it remains through life. The teeth are the only bones which are without periosteum, being naked upwards, and below covered by the proper membrane of the gums.

Most quadrupeds have during life two sets of teeth, a *temporaneous* or *milk set,* and a *permanent* or *adult set.* The first usually appears at, or soon after birth; the other about the adult period. This change, by which the milk are displaced for the permanent set, is very gradually performed, some years elapsing between the appearance of the first and the last; by which means the animal suffers no inconvenience: were they all, or even several of them, to remove at the same time, the animal would suffer great injury. To prevent such inconvenience to the elephant, the replacement of his teeth is so conducted as never to be completed, or, at least, not to the age at which observation has followed him. It is thus nature compasses the same ends by different means; and were we fully conversant with the natural history of each animal, we should find that each mode was best suited to the wants of its possessor. In the horse also some speciality occurs in this respect, for the three last pairs of molar teeth are usually permanent and seldom shed. The dentition of the ruminants follows nearly the same order as that of the horse: nor is their dental structure dissimilar.

Although the temporaneous and permanent sets of teeth appear with an interval of some years between them, yet the rudiments of both are formed nearly at the same period; at least we know, that as soon as the temporaneous are evident, the traces of the other can be distinguished immediately under them, and they are only prevented from making their appearance by the pressure occasioned by the first: thus, when one of the first set is drawn, its place is soon filled up by one of the second set, and this appears to be the intention of their early formation, by which they may be always ready to fill up any accidental displacement that may occur before the usual period. If it be asked, why does not the same pressure which keeps down the permanent set remove the temporaneous above them? it may be readily answered, that these lower teeth are not sufficiently consolidated, but as soon as they become so, they in turn become the pressing bodies, and the roots of the temporaneous set, submitting to the stimulus, become absorbed. Dealers, aware of this early appearance of the second set when the first are accidentally removed, frequently effect the removal by artificial means, to make young horses appear older than they are.

It was essentially necessary that there should be two sets of teeth; for as these bodies grow but slowly in proportion to the jaws, so, had there been but one set, the disproportion in growth between the teeth and jaw bones must have separated the teeth from each other, and thrown them wide apart as the jaws increased in length; hence there is given at first a small and less numerous set, adapted to the size of these bones; but as the rudiments of the second set are larger as well as more numerous, so they take up more room, and are therefore at this early period actually situated within the branches of the posterior jaw, necessarily evolving only as the jaw lengthens out. The living powers in the teeth are kept up, as in bones in general, by nerves and blood vessels, which may be traced entering the hollows in their roots from trunks described in *Angiology* and *Neurology*, and we have sufficient proof of their having absorbents, by the removal of the roots of the temporaneous set by the process of absorption *.

The *incisive* or *nipping* teeth are six to each jaw, which the French distinguish by the terms *pinces,* as applied to the two in front, *mitoyenne* to the intermediate, and *coins* to those at the corner. In the older books of farriery they are also called nippers, gatherers, and separators; but it would be better to begin at the corner, and to call them the first, second, and third incisives. These teeth are curved, which is favourable for the pressure they undergo, the upper more so than the lower; they have two surfaces, an inner and an outer, the former of which is rounded, but the outer presents a groove up the middle on their upper surface, surrounded by a dark marking; a remarkable oblong hollow is seen into which both the enamel and crustra petrosa enter. This cavity is not complete in the corner teeth, being interrupted by a species of artificial side or internal wall received within an inflection of the outer: these teeth are also slightly triangular and shelly in the foal, and are thinner than the others in the adult horse. (See *Plate of Teeth.*) This cavity of the nippers is not of great depth, but appears most considerable in the corners, less so in the contiguous teeth, and least of all in those in front; from which circumstance the regular wear of these teeth by attrition has furnished us with a pretty just *criterion of the age,* as before noticed, in the successive disappearance of these cavities. The two front nippers, as having a shallower cavity, are soonest filled up, and which takes place at about six years old. At seven, the cavity of the next disappears; and at eight, the corners become plain. In the upper nippers the cavities are originally deeper and much more permanent, not being wholly effaced before the age of fifteen or sixteen. At very advanced periods of life, as twenty-five or thirty, the direction of these teeth alters materially, partly from their curved portion wearing away, and partly from an alteration in the alveolar portion of the jaws.

The four *cuspidati, canine*†, or *tusk* teeth, are usually, but not invariably, wanting in mares, and are situated one on each

* The morbid phenomena of dentition are happily not common to the brute young as to the human infant, neither do they seem to suffer any sympathetic sensibility as is frequent in ourselves.

† Why these tusk teeth. common to various orders of quadrupeds, and to man also, should receive the generic term *canine*, appears extraordinary. In man, the monkey, the horse, &c. &c. they may be considered as intended to preserve that beautiful regularity conspicuous throughout the links of Nature's vast chain; while to the elephant, the boar, the dog, and some other

side of the upper and lower jaw, in the space between the incisive and molars. Those of the anterior jaw are usually nearer the nippers than the posterior. There are no temporaneous tushes, but one set only, which appears about the adult period, growing slowly, and, when completely evolved, presenting a curved appearance, turned inwards, with an outer plain surface, and an inner one with two perpendicular grooves, and an intermediate rising. The upper part is pointed, which point wears away by age, leaving the tush blunted, and the internal surface smooth and equal with the outer; and as these appearances cannot be restored, the tushes may be depended on as a guide in judging of the age when a horse is suspected of having been *bishopped* *.

The *molares*, or *grinders*, are twelve to each jaw. The upper are larger and stronger than the under, as they form the fixed point on which mastication is performed. The milk or molar teeth are oblong and even; the permanent set presents an oblong at the first appearance of each, which pressure gradually lessens into a more perfect square. The grinding surface of each of these teeth presents irregular rising lines from the interposition of plates of enamel within the ossecus portion †;

quadrupeds, being long and pointed, they form advantageous weapons of defence. In these animals they might therefore with propriety be called *pugnatory teeth*.

* Bishopping appears to have derived its name from a singular species of deception practised by a person of the name of Bishop; and which consists in indenting on the plane surface of the worn teeth a fresh cavity by means of a very highly tempered pointed instrument. This done, the new formed cavity is burnt black.

† By comparative anatomy we are frequently enabled to throw great light on the functions of particular parts of the human body, by which some of the obligation due to the knowledge of the latter are repaid. I have had frequent occasions of pointing to this mutual advantage; perhaps a more felicitous one does not occur than the present, in which erroneous notions on the subject of the preservative use of the enamel have prevailed, and are yet every day insisted on by dentists. Were a preservative quality the principal use of the enamel, the teeth of both man and beast would be seldom free from decay. In both the one and the other, parts of the teeth are entirely deprived of it, and in neither does decay take place at such parts. The depressions on the broad surfaces of the horse molar teeth are, as described above, purposely formed from the first without enamel, and on the surface of the incisors or nippers it early wears away, and yet caries is almost unknown to both. The human incisors also wear from a sharp edge to a flattened surface entirely uncovered by enamel, but on which surface caries never commences; on the contrary, when these decay, the disease commences at the neck of the tooth where the enamel is thickly encrusted over. The first carious spot usually seen in the human molar teeth, is in the deep depressions on their semi-incisive grinding surface where the enamel can suffer no abrasion: add to which, that decay in a tooth may generally be stopped, if the whole of the diseased portion be filed away. Some tribes among the Indians, remarked for the soundness and goodness of their teeth, always keep them filed to a point; we therefore learn by collating these facts that the enamel of the teeth operates but little in preserving them from morbid decay, but that its

by which admirable contrivance an uneven surface for trituration is constantly kept up, the enamel wearing less easily than the bony portion; and as the anterior or upper teeth hang over and project beyond the others, so the ridges of the one set are received into the depressions of the other; by this means not only rendering the grinding process more complete, but permitting a just application of the teeth, and a consequent complete shutting of the mouth during a state of rest. The grinding surfaces of both the upper and under molar teeth are not perfectly horizontal; on the contrary, they have an inclination inwards, and the upper teeth are not so closely applied to each other as the under, by which the masticated food finds a more ready passage, and more naturally falls within the mouth. The teeth of the horse are but little subject to the carious decay common to the human teeth; they are however somewhat subject to exostosis, and sometimes to the addition of little supplementaries, called *wolves teeth:* but the principal evil to which they are subjected arises from an inordinate degree of wear, the consequence of the hard nature of the food we force them to chew. Hay, it is evident, is much more difficult of mastication than grass, and corn infinitely more so: and as in a state of nature horses would be unlikely to meet with much of these matters, so the wear on the teeth in full-fed horses may be supposed more than was by Nature intended for them, and consequently more than their powers are equal to. That such is really the case is confirmed by what occurs in many old horses, in whom great wasting and weakness often occur without the cause becoming apparent, in consequence of which they are sometimes destroyed in the full enjoyment of all their other capabilities, under a supposition that they are altogether worn out. In such cases a defect in the teeth is often the only cause of the evil, and if the horse be attentively watched he will probably be observed to incline his head altogether, and particularly his under jaws, in such a direction as to favour the application of the food to the deranged surfaces. Such a horse will also often be found to *quid* as it is termed, or to partially chew his food, and then to throw it out of his mouth. If an examination of the mouth be made in such cases, it will frequently be found that a misapplication of the teeth exists, the effect of long and undue wear; the inner surfaces of both the upper and under grinders, but more particularly so of the upper, being worn away and bevilled, rendering mastication difficult and incomplete; to remedy which the animal endeavours to throw the wear on the outer edges, which occasions the peculiar inclination of head mentioned. It also

principal use is, by its extreme hardness, so to temper the teeth, as steel tempers iron, that they may resist the impressions of constant mastications, and make the wear of these organs commensurate with those of the body in general.

sometimes happens that this uneven wearing leaves pointed prominences which penetrate the cheek, by the increased efforts in the molar muscles to force the food in a new direction: mastication now becomes painful as well as difficult, and the horse refuses his food. This latter case may be commonly remedied by either the chisel or file; but when the misapplication of the general surface is considerable, it requires much care and pains to remedy the defect, which can only be done by using a very well tempered file, having first cast the horse and propped open his mouth. I have however succeeded by a daily application of the file without casting the animal; by which I fatigued myself less, and did not at all endanger the horse. Unless the process be very effectually done, it is surprising how soon the defect returns; and even when it has been very judiciously practised, one or two years is apt to renew the evil, except the horse be ever after kept on mashed food, grass, carrots, &c., when he may remain useful for a considerable time.

The Bony Trunk.

The *trunk* of the horse consists of the *spine, pelvis,* and *thorax* or *chest.*

The *spine* is formed of seven cervical *, eighteen dorsal, six lumbar, and five sacral vertebræ, with the addition of an indefinite number of small bones of the coccygis, or tail, usually amounting to about thirteen. The spinal bones are thus divided, on account of the varieties they present; but they have some characteristics in common; each being composed of a spongy considerable substance, named its *body,* and parts protruded therefrom, thence called *processes.* These processes unite to form a hollow, through which the medulla spinalis or spinal marrow is transmitted, and by some of them the vertebræ are articulated with each other, as well as by their bodies anteriorly and posteriorly; by which means the surface of attachment of these bones is much increased, and the strength of the spinal column thereby rendered very great. Though but little motion is allowed between any two of these bones, yet the flexibility of the whole spine is considerable; by which wise contrivance the spinal marrow, nerves, and blood vessels, are not liable to compression.

The *cervical vertebræ,* which are by far the largest of the whole, are situated within the neck, and are known to farriers and butchers by the name of *rack bones.* They have but a very indistinct spinous process, but by a common base on each side arises a very considerable prominence, which branches out into two transverse processes, at which base is

* It was the remark of that great physiologist, John Hunter, that the number of the cervical vertebræ is the same in almost every known quadruped, although the number of the other vertebræ varies very considerably.

seen a foramen for the passage of the vertebral arteries and veins. Each neck vertebra likewise forms a groove posteriorly, which, united to one in its opponent, produces a hole, which, communicating with the great spinal canal, allows the cervical nerves to pass. (See *description of Skel.*) The vertebræ are each connected together by a round head, received into a corresponding cuplike cavity at the posterior part of every one but the first; and which union has articular cartilages, dense capsular ligaments, and all the appendages of a joint. It will be evident, that from the strong means of articulation they have with each other, not only by the round head and corresponding cavity, but more particularly by their oblique processes, that no dislocation can take place between any of these vertebræ but between the first and second, in which case the animal inevitably dies from the compression of the spinal marrow; and which accident is what is usually called breaking the neck.

The *first* cervical vertebra *(vide a, vertebræ Skel.)* in the human receives the name of *atlas*, but which is here inapplicable, for the head does not rest on it, but is rather supported by it. It branches out laterally into two transverse portions; anteriorly it articulates with the occipital bone, receiving into its fossæ the two occipital condyles: on each side are two foramina, one of which transmits the vertebral vessels, and the other a pair of nerves. Posteriorly it articulates with the second cervical vertebra, receiving its odontoid process into its great cavity. This vertebra is the only one of the cervicals that has not the great suspensory ligament attached to it, which had it so done, would have interfered with its freedom of motion.

The *second* cervical vertebra, which is named *dentata (vide d, e, f, plate of Skel. vertebræ)*, from a considerable process supposed to resemble a tooth, by which it enters the great cavity of the first, is in the horse a large long bone, presenting several peculiarities. Instead of a spinous process, it has a longitudinal dorsal ridge, to which the cervical ligament is attached; neither can it properly be said to have any oblique processes, for anteriorly what would be so called are blended together so as to appear a mere extension of its body: posteriorly they become more conspicuous, and articulate with the upper oblique processes of the third vertebræ *(vide h)*, whose head is received into a cup-like articulating cavity in its body posteriorly. Another peculiarity arises from its transverse protuberance, which presents only a posterior point *(vide d, d)*, forming a single process on each side. The non-attachment of the cervical ligament to the first cervical bone, and the peculiarity of the articulation between that and the second, leaves an opening, which exposes the spinal marrow or *pith of the neck*, as it is termed by knackers and butchers, who, when they want to kill without effusion of blood, plunge a pointed knife into this opening between the first and second *rack bones*, which, dividing the spinal medulla, instantly kills, and which they call *pithing*.

The *third, fourth,* and *fifth* cervical vertebræ bear a common resemblance, and possess the general characters of anterior and posterior articular processes *(h, n)*; as well as of lateral transverse ones *(i, k)*. Their dorsal ridge is small, and their foramina and perforations are the same as in the preceding. Each articulates anteriorly with the one before it by its head, and posteriorly with that which follows it by its socket.

The *sixth* differs from the former only in wanting an inferior ridge.

The *seventh (b)* is the smallest of the whole, presenting transverse processes, small and not bifid as those of the preceding; neither is it perforated by a foramen: its spinous process is more elevated than that of the others, and by its posterior oblique processes it articulates with the two first ribs, presenting at the back part of its body two semilunar articulatory cavities, which, uniting with fellow hollows in the first dorsal vertebræ, form appropriate indentations for the reception of the heads of the first and second ribs.

The *dorsal vertebræ* are eighteen, in a few instances there are nineteen (*vide* 18 *vertebræ, Plate* I), and do not essentially differ from each other but in the length of their spinous processes, which in the first seven or eight is considerable, for the purpose of giving a long lever to the dorsal muscles. It is these processes that give height to the withers; and as they are covered with muscles that act on them strongly, so their length is of great consequence to progression. Their four oblique processes are small, as well as their two transverse. They articulate with each other by their anterior and posterior surfaces, and by their oblique processes; and each articulates with two ribs on each side. As they advance in number they increase in size, are pierced by the spinal canal, and transmit by their lateral holes the spinal nerves; but they have no foramina at the base of their transverse processes. Between each is interposed a substance of the mixed nature of cartilage and ligament, which is most compressible at its sides, permitting the motion of the spine, and forming, by the solidity of its centre, a fulcrum or pivot for the bones to move on. This substance is nearly ossified in the old horse. It is not, therefore, to be wondered, why the motions of the animal should be less elastic, or why, in horsemen's language, an old horse should be less *springy* in his gait.

The *six lumbar vertebræ* differ but little from the dorsal; their bodies are rather larger, and their spinous processes consequently rather broader; but their transverse processes bear no comparison to the others: for as there are now no ribs to protect the contents of the abdomen, nor to support the dorsal muscles, these take their place, and consequently become much lengthened out; and hence they have no articular surfaces but those by which they unite with each other: the last of them joins with the sacrum. (*Vide* 1, 5, *vertebræ, Plate* I.)

It will appear evident from the foregoing description, that the vertebral bones enjoy different powers of motion; that the head is enabled to rotate and move extensively upon the first; and that this first moves also freely on the second. The remaining cervical vertebræ have likewise much motion from the form of their articulation, and the smallness of their spinous ridge. The dorsal vertebræ can have little freedom on account of the straightness of their union, and the situation of the ribs; while the lumbar enjoy rather more, though from the length of their transverse processes the difference cannot be considerable.

The vertebræ of the spine in the horse very seldom take on spontaneous ulceration: but they are liable to malconformation, the spinal column being sometimes curved upwards, and sometimes downwards more than is natural. These bones are also liable to exostoses, to such a degree sometimes as to anchylose nearly the whole dorsal and lumbar joints. It is to this cause that old horses are, many of them, so stiff, as to be unwilling to lie down; or when down, to rise up again. The lumbar vertebræ are also the usual seat of those injuries called *broken backs, chinked in the chine,* &c., and which are known by the peculiar straddling, unsteady gait of the animal. Anchylosis will sometimes occasion this affection, by the increased deposit of bone pressing on the medulla spinalis, by which a partial paralysis ensues. (See *Exostosis.*) In some instances, though rarely, fractures or dislocations likewise occur between these bones, from casting or other accidents: when dislocation is complete, or a fracture extends through the whole body of the bone, total paralysis of the hinder extremities occurs. (See *Fractures and Dislocations.)*

The *pelvis.*—The trunk is bounded by a bony mass or irregular ring of great extent and substance, directed horizontally forwards and backwards with a small intermediate posterior appendage named coccygis. These united masses are named the *pelvis* or *basin,* from their containing within their boundaries important viscera. The largest portions are formed by the sacrum and two ossa innominata.

The *sacrum,* which in the colt is formed of five pieces or false vertebræ, is so united in the adult horse to increase its strength, that it forms one solid mass, resembling in form the lumbar vertebræ. It presents a convex form externally, and a concave one internally, which is smoothed for the reception of the pelvic viscera. By an imperfect oval head it articulates with the last lumbar vertebræ, with the oblique processes of which it is also united by two articular surfaces: a groove is jointly formed between these bones on each side, for the transmission of the last dorsal pair of nerves. The transverse processes are strong, and extend its whole length; the spinous are directed backward and downward. The spinal canal begins to diminish considerably in size in this bone, from the medulla parting with most of its substance to form the sacral nerves, which are transmitted through eight pairs of foramina at the under surface of the bone. Two articular surfaces appear on it, by which it joins the ilium: posteriorly it articulates with the first coccygal bone (*vide xx*).

The *coccyx*, or *bones of the tail*, vary in number: there are generally about fifteen (in the ass sometimes sixteen, seventeen, or eighteen), which degenerate in their vertebral character as they descend. The spinal canal, through which the medulla is continued under the name of *cauda equina*, is purely bony in the first four or five of them only, being continued partly bony and partly ligamentous in the remainder. The first two or three pieces have marks of transverse and spinous processes, and the whole number articulate with each other by true joints.

The two *ossa innominata* (*a, b, c, d, e, f, g, Skel.*) are usually described as three pair of bones, though all traces of their distinct existence are lost long before the adult period. In quadrupeds like the horse, ox, and sheep, not born indigent, but intended for early exertion, they are consolidated even at birth, and are only to be found separate in a fœtus of three months. The three portions, of which the os innominata is early formed, are the os ilium, the os ischium, and the os pubis. The *ilium* (*a, b, c, Skel.*), which is the most considerable of these, is not rounded as in the human, but extends out into three distinct branches by portions of which the haunches are formed (*vide a*): when they are more extended than usual, the horse is said to be *ragged hipped*. From the tuberosity, one of these branches runs towards the sacrum, and turns up into a tuberous spine, very unlike the human, and which articulates by its inner surface with the sacrum (*vide b*), to which it also unites by its posterior angle. Anteriorly it is roughened for the attachment of the abdominal muscles, and its inferior branch terminates in the ischium. At its superior branch is seen a remarkable space between two of the dorsal apophyses, apparently intended to give considerable flexibility to this otherwise stiff part. From a slight inspection of this portion of the pelvis, it will be evident that the rugged outline of the rump in cattle arises from the great prominence of the spine of the ilium, assisted by the extended tuberosity of the ischium. In the horse the dorsum of the ilium is also large, and in some of his neglected breeds the tuberosity of the ischium, and the extension of the protuberant lateral branches of the ilium, give almost as deformed an outline to them also.

The *os ischium,* or *hip-bone,* is a larger portion of the innominatum than the pubis, but a less one than the preceding (*vide e, f*). It has three angles, and an inner and outer surface: by the anterior of these angles it unites with the ilium and pubis, and forms part of the *cotyloid cavity:* by its posterior it stretches back jointly with the superior to form a curved process, called its *tuberosity* (*vide f*), which is very different to the same part in the human. Its superior angle is convex, and gives attachment to the sacro-sciatic ligament. Between the anterior and posterior angle it forms, jointly with the pubis, the oval cavity called *foramen thyroideum,* or *ovale* (*vide d*).

The *os pubis,* or *share-bone* (*vide g, g*), is the least of the three portions: by its anterior edge it unites with the ilium, and, with its fellow, forms the *symphysis pubis.* On the outer and inferior part of these pelvic bones a cotyloid cavity or socket presents itself, lined with cartilage, and which is intended to receive the head of the femur. This articulatory cup is called the *acetabulum,* and is formed by the assistance of each of the above portions, but in unequal degrees; the pubis adds least, and the ischium most. The depth of this cavity is greatest superiorly and anteriorly, where the danger of dislocation is most; at the lower portion it is very superficial, and has a kind of interruption, by which formation the thighs are enabled to cross themselves to a certain degree, and to pass under the body: but, that this interruption might not endanger the safety of the articulation, it is filled up by a ligament, and its whole brim is deepened by a cartilaginous crust around it; from which wise precautions, the thigh bone is very seldom thrown out of this socket. The pelvic bones are strongly attached to the sacrum by the articulating surfaces we have described, and are held in these attachments by strong ligaments from the anterior and posterior edge of the articular part of the ilium, uniting it to the risings corresponding with the transverse processes of the sacrum. The whole of the large posterior opening between the innominata and sacrum is filled up by two strong layers of ligament, which in the animal should be called its *sacro-iliac* and its *sacro-sciatic ligaments.* These two layers divide and permit the pyriformis muscle, the sciatic nerve, and posterior crural vessels, to pass out of the pelvis. From this, therefore, it may appear, that the basin forms a very complete cavity, having all its openings closed either by ligaments, muscles, or integuments, except an abdominal one before and an excretory behind.

The *thorax,* or *chest,* comprises the sternum and ribs. The *sternum* of the horse differs very much from the human breastbone, which is a perpendicular flat pile of bones; but in the horse is inclined, and not dissimilar to the keel of a vessel, furnished at both ends with a cartilaginous portion; that of the posterior being considerable, and from its figure called *xiphoid,* or *ensiformis**. It is, in the colt, composed of six pieces, which unite in the adult: the three anterior portions are sharp, and covered with cartilage; the remainder are flatter. The two lateral surfaces receive the cartilaginous extremities of the true ribs. (*Vide d, Skel.*)

The *costæ*, or *ribs*, are long perpendicular bones, with one end attached to the spine, and the other connected with the sternum, either directly or indirectly. They are usually thirty-six, eighteen to each side, seven or eight of which articulate with the sternum, and are thence called *true ribs;* while the remaining ten or eleven unite together by intervening cartilages, and are called *false ribs*†. The central ones are the longest, the others gradually decreasing in length both towards the neck and loins. The first is placed almost perpendicularly, the second less so; and their curvature, as well as their inclination, increases as they advance, so as to enlarge the dimensions of the chest, till it becomes nearly circular (see *Plate of Skeleton*). As they proceed towards the pelvis, their inferior extremity is carried backwards, increasing still more the dimensions of the carcase, and strengthening the parietes of the abdomen. Each of them has a body, an upper and a lower extremity, and an upper and under surface. The upper extremity presents a small head (*vide a*), and a small tuberosity: this head articulates by two surfaces to the bodies of two vertebræ, and the tubercle with the transverse process of the posterior of these two vertebræ. The upper extremity is rounder than the body and inferior extremity. The anterior edge of each has a groove, in which run the intercostal vessels and nerve, which it is very necessary to be aware of in operations on the chest. Above this, likewise, is a ridge to which the intercostal muscles are attached, fixing themselves into the opposite edge of the next rib. To the lower extremity is a cartilage firmly attached, articulating with the sternum, or with each other.

The ribs are fixed to the breastbone and spine by strong ligaments: each lower extremity has attaching fibres fixed into the articular pits in the sternum; and the upper extremity is connected by articular as well as capsular ligaments. It must be evident that the ribs in the horse have but little motion, and

* In lean subjects the anterior part of the sternum may be often seen, and is so prominent as to be liable to be wounded or bruised. When a tumour follows, it is apt to be called *anticor;* but is then very different to the *anticœur* of the French, among whom it is most prevalent. (See *Anticor*.)

† In the former edition I have stated the number of true ribs definitely as eight: in some cases there are seven only, but in many others a slight articulation is evident between the sternum and the eighth rib. When the number exceeds thirty-six, which it sometimes does, the eighth is always a true one, and sometimes even the ninth is so likewise. In the Woolwich Museum an instance of forty ribs occurs. The number of costæ in the ox and sheep are eight true and five false.

that what they have, must be forwards, particularly in the true ribs, the first of which is completely a fixed point for the rest to act upon: the false can be elevated a little, by means of the flexibility of their inferior attachment, and which appears the reason that they are thus attached. But this small motion would not be sufficient without some other contrivance to enlarge the chest during inspiration, which is effected by a very moveable diaphragm. The animal thorax could not have been formed as the human, without detracting from the ease and stability of motion; hence to approximate the fore extremities, it was necessary to flatten the chest: yet a posterior expansion of this cavity is not only allowed, but required, and is as essentially necessary to the horse as to the man. The greater convexity the ribs have, the more the chest has a cylindrical form, which is, of all others, the most extensive, and hence capable of carrying on the important functions of chylification and respiration to greater perfection; for, as the belly usually partakes of the form of the chest, so a flat-sided horse is generally without much carcase also. It must, however, be observed, that where the chest possesses great depth, the defect, as regards respiration, is remedied; and this form seems the best adapted for animals of speed, as we witness in the race-horse and greyhound. But where hardihood and a ready separation of nutriment are studied, the circular form (although when carried to an extreme it detracts from the perfection of the fore extremities by removing the scapulæ distant from each other, and constituting a *thick shoulder*) is the most advantageous.

The Anterior Extremities.

These bear but little resemblance to the human arm, particularly in those quadrupeds, as the horse, who have but one phalange: in those with several, the resemblance approximates much more, till in the fore extremities of the ape they differ little but in the thumb, which forms a bad antagonist to the fingers. It appears a very wise provision of nature, who has given a colt very long limbs at birth, that the form of parts might not be much altered in their future evolution; but, at the same time, the hinder ones are by much the longest; because, were the fore equally so, the young animal would have been too much elevated from the ground, and rendered incapable of grazing, or even of sucking conveniently.

The *scapula,* or *shoulder blade,* is a broad and rather triangular bone, applied to the chest, so that its apex reaches between the first and second ribs, and the posterior part of its base as far as the seventh*. It is, therefore, situated oblique-

* Mr. Percival remarks, that Stubbs, and other delineators since his time, have represented this bone higher than it is naturally placed, as well as less oblique in its situation. In this observation I believe Mr. P. is correct. It is, perhaps, not altogether so high in the living subject even as represented

ly, with its broadest portion above, and its tuberous extremity below. Its internal surface is flat and smooth, and its external is divided into two unequal portions by its spine. Its anterior edge (*vide m, i*), as it continues down, contracts inwards, and ends in a blunt rounded extremity, called in the human its *coracoid process,* but which in the horse is not very beak-like; on the contrary, the horse cannot, strictly speaking, be said to have either coracoid acromion or recurrent process. Its superior surface is furnished with a considerable cartilage, strongly adhering to it by ligamentous fibres, by which the surface of attachment of the muscles of this part is much increased; yet the weight and thickness of the bone are but little augmented thereby. The posterior edge inclines inwards, and ends in the cervix, or neck, which furnishes a superficial excavation to receive the head of the humerus or arm, called its *glenoid cavity* (*vide e*). The *spine* (*vide h*) is a considerable rising which divides the external surface into two portions, till towards the lower part, where it forms a rounded extremity, which in the human is stretched out, to form a sharp process, called acromion, but which in the horse is absent; for, as in him there is no clavicle to articulate with, so such formation would have been useless. The two portions formed by the spine are called the *antea* and *postea spinatus fossæ.* The antea spinatus fossa (*vide f*) is the least and most superior; the postea spinatus fossa is the larger and most inferior (*vide g*).

The scapula is attached to the chest by very strong muscles, but it has no bony nor any ligamentous union, unless the strong aponeurotic expansion from its cartilaginous base can be so considered: it is particularly held in its situation by the serratus major, which is so spread as to attach the scapula, and sustain the chest by its very strong tendinous fibres. At its lower part it is fixed by the pectoral muscles; and we accordingly find, that when, from a slip, the legs have been forced too wide asunder, forming what is termed a shoulder wrench, these muscles become tumefied and tender. By this muscular attachment, the scapula has much motion round its own centre, having no clavicle to confine it. Its usual situation is, to a plane perpendicular to the horizon, under an angle of thirty degrees, and it has a motion, in its greatest extent, of about twenty degrees; hence, as it does not pass beyond the perpendicular backwards, so the more oblique its situation, the greater number of degrees in the circle it can move through; and in the same degree it can assist the action of the humerus, with whose angle its own is commonly consentaneous. The use of

in my plate; but I cannot agree with him, that in a natural state the process improperly called coracoid is opposed to the sternal extremity of the first rib. The correctness of the general degree of obliquity (for it varies considerably in different horses) is, I believe, perfect in my representation of it, and the height also nearly so.

this bone is to serve as a moveable point to the arm, which greatly enlarges the motion of the whole extremity, and renders it more universally extensive than that of the hinder limb: hence it becomes also evident that a glenoid cavity is fully able to protect this articulation; and that a dislocation between the scapula and humerus, as being so moveable, is even less frequent than between the acetabulum and femur, where the os innominatum is not able to follow the motion of thethigh *.

The (*os humeri*) *humerus*, or bone of the real *arm*, is strong, short, and very unlike the same bone in man. It extends from what is called the point of the shoulder to the elbow (*vide n, o, p, q, Skel.*), forming an angle with the scapula, extending obliquely backwards, as the shoulder does obliquely forwards. At the posterior part of the extremity, the bone stretches out into a round head supported on a cervix (*vide n*), with a circular fossa surrounding its base, for the insertion of the capsular ligament; this head is received into the glenoid cavity of the scapula. The anterior part of this upper extremity is what is improperly termed the point of the shoulder (*vide o*), and has three prominences, into which the extensor muscles of the arm are inserted; and between the two most anterior of which the firm flattened tendon of the flexor radialis anticus passes, tied down by a cross ligament. This tendon is almost of a cartilaginous hardness, and is flattened out into a species of patella to this articulation; answering all the purposes of the patella of the knee, and effectually preventing any dislocation of this joint forwards; which is the only point in which it would otherwise be at all probable. The body of this bone has an external and internal tuberosity, for the insertion of the adductor and abductor muscles: as it proceeds it becomes broader, and at its superior extremity it terminates into its inner and outer condyles (*vide q*), divided by articular risings and depressions, which are received into similar depressions and risings in the superior extremity of the radius; thereby confining the motions of this joint to flexion and extension. In the front of this extremity is a cavity to receive the protuberances of the radius, in the greatest flexions of the fore arm; and behind there is a very deep depression for the reception of the olecranon or elbow, when it is again extended. The humerus is attached to the scapula by a capsular ligament, which extends from this bone to the cervix of the omoplate or shoulder blade; over which are extended, both externally and internally, strong ligamentous layers from one bone to the other; and when are added to this the peculiar tendon I have de-

* The different situations of the æquine and human scapulæ must at once strike the observer. It has been very justly remarked, that the horse here presents no proper back, for the withers can hardly be considered as such. In the horse the shoulder blade does not pass out of the plane of the os humeri, whereas in the human it forms an angle with it.

scribed, and the tendinous expansions of the other muscles, it will be seen that this articulation between the humerus and scapula is a very strong one. The os humeri is confined in its motions to being brought from its inclined position backwards to a perpendicular one of the limb *in situ* forwards. When its length is too great, it necessarily brings the legs of the horse too much under him, and, to keep the angle correct, this defect is always united with an upright shoulder.

The *fore arm* is composed of the *radius* and *ulna* [*vide f, r*], (called among horsemen, by an erroneous though very old custom, the *arm* and *elbow*), but which become so intimately united in the old horse, as to be by some, and without any great impropriety, described as one bone*. The *radius* is the long cylindrical portion composed of a body and two nearly equal extremities. The superior end is flat, and receives into its articular depressions the condyles of the humerus; it presents anteriorly tuberosities for the attachment of muscles, and posteriorly an articulating surface for the ulnar portion of the bone. Its body is slightly convex anteriorly, and its inferior extremity is furnished with four eminences, covered with cartilage, which articulate with the first bones of the carpus or knee. The anterior part of this extremity is depressed with

* Bourgelat describes the radius and ulna as one bone, under the name of cubitus. La Fosse speaks of them as two bones, radius and cubitus. Cubitus in veterinary authors is sometimes applied to either bone, because in the human these bones are nearly of a length, and not far distant from the measure of a cubit; but as this will not apply to either of these bones in the horse, the term ought to be rejected entirely. A parallel of comparison between the human and brute subject will here fail in many essential particulars, and some speciality of formation in these bones, but of the ulna in particular, from the human, is observed in all true quadrupeds, and which is always guided by the habits of the animal to which they belong. Nevertheless, as the intentions of Nature are best displayed where her works are the most complete, it will materially illustrate the uses of brute parts, to examine the same at the fountain head. In man the *elbow-joint* will be found to be a complex and curiously contrived piece of mechanism; and that in him the *ulna*, instead of being an unimportant part, and a mere appendage to the radius, is, in fact, the larger of the two, receiving above a tubercle of that bone, whilst below it is the radius which furnishes the articulatory cavity, and the ulna supplies the tubercle; by which formation the human hand enjoys fully the rotating motions of pronation and supenation, the radius moving on its own axis at the upper end, and revolving round the ulna at the lower. In the canine, feline, and some other tribes, where the paws are used in some measure as prehensile organs, the ulna is also found sufficiently perfect for variety of motion; but in the horse and the ruminants, where a supine state of the limb would have been inconvenient, it shrinks into a mere process, not moving on the radius, but anchylosed with it. By this firm union great strength is gained. Nor would the safety of this important part have been studied without such provision, for the immense lever of the extended process or olecranon would have endangered any other opposition of it, without thereby gaining any advantage, its motions being confined to flexion and extension, as the member it belongs to is principally employed in progression. Support and progression therefore being in the horse expected from the fore limbs, they exhibit every contrivance to increase their strength without destroying their elasticity or increasing their bulk.

three sinuosities, receiving the tendons of the extensor muscles of the foot. It is observed in all animals intended for speed, that the length of this bone is very considerable; in the hare and greyhound, the knee is but a very small distance from the ground; and a long fore arm is found by experience to be equally favourable to celerity of motion in the horse also, and such formed legs are by good judges always preferred. The parts below the knee appear to be bent in progression, to receive the weight of the machine, but not to add to the extent of its progress; and if the extent of progression be effected by the parts above, the longer they are the better. It must likewise appear, that a decrease in length in the parts below must be equally favourable to strength as the increase above is to the speed, though it possibly detracts something from the ease and rebound of the spring; for which reason amateurs in the manege always choose a short arm as better adapted to the cadences taught by that art. The *ulna* is articulated in the young horse at the posterior and superior part of the radius with intervening cartilages, and strong ligamentous fibres; it then stretches downwards (see *Skeleton*) unattached, permitting vessels to pass between, till it has reached the middle of the radius, when it terminates in a point, which is likewise attached by ligamentous fibres. As the horse advances towards age, the intermediate cartilages become absorbed, and bony fibres thrown out, which form an inseparable and anchylosed union between them. The ulna stretches out superiorly into a powerful process covered with cartilage, which is received into the great posterior fossa of the humerus; from which the whole extends backwards to form the olecranon, so called in conformity with human anatomy, whose whole surface is rough, for the insertion of the strong extensor muscles of the fore arm. On the slightest inspection of the skeleton, it will appear how much the motions of the fore extremity must depend on the length and obliquity of this process; which acting on the principle of a lever in the extension of the arm, must necessarily, as it is long or short, make all the difference between a long and a short purchase. This bone likewise serves to keep up an equilibrium between the flexor and extensor muscles. The ulna and radius are articulated with the humerus, by a very extensive capsular ligament which takes in the whole articular surface. This articulation is strengthened by an external and internal ligament, extended from the condyles of the humerus over the head of the radius, and likewise by powerful tendinous and aponeurotic expansions spread over the whole, by which means this joint is wholly prevented from dislocation: but the olecranon has been found at times fractured; under which circumstances, from the great strength of the muscles implanted into it, a proper and complete apposition of the fractured extremities would be extremely difficult.

Punctured wounds likewise sometimes happen in this part, when, if motion be kept up, a large quantity of air becomes absorbed, forming extensive emphysema. Both these bones are occasionally the subject of deformity, and are likewise now and then affected with exostoses.

The *carpus*, or *knee*, as it is universally called in the horse, according to the human anatomical nomenclature is the *wrist*. It is therefore evident, that either carpus or knee is an erroneous term, of which this is not the only instance by many wherein an adherence to the human anatomical terms is attended with inconvenience, begets confusion, and encourages palpable misnomers. These circumstances have occasioned some attempts among modern veterinarians to correct the more prominent instances of incongruity by a more appropriate nomenclature, which the discrepancies have certainly called for*; but unwilling myself to introduce discordance between this and the former editions of the *Veterinary Outlines*, and still more to set myself up as the arbiter, I shall continue the nomination of these bones as in the former edition. In the articulated skeleton there are *seven* principal carpal bones met with, and which in fact are all that are necessary to the joint: but in the recent subject there is commonly but not invariably found an additamentary osselet of the shape and size of a pea, situated behind and articulated with the trapezoid alone: sometimes it is wholly unarticulated, and at others altogether absent. This small bone, when it does exist, ought to be considered as the true pisiform. The *seven carpal bones* which compose the knee of the horse are arranged in two rows. The upper row articulates with the inferior extremity of the radius, and is formed of the os scaphoides, as the first of them commencing from the inside of the row (2, 2). It is the most considerable bone of this range, and articulates with the internal condyle of the radius anteriorly, and laterally with the lunare; so that the scaphoid and lunare are placed over the magnum in front of the knee, as, in building, two bricks are placed so that their line of division is over the centre of a third, by which means great strength is given to this articulation; it likewise articulates inferiorly with the trapezoid. The *lunare* is the second bone of this row (*vide* 3, 3), articulating above with the middle and anterior part of the radius, below with the magnum and cuneiform, and laterally with the scaphoid and cuneiform, and by a small posterior point to the pisiform. The *cunei-*

* Mr. Percival has very correctly observed that it is erroneous to call a bone of the shape and size of a pea *trapezium*, or a large quadrilateral one by the name of *pisiformis*. It is not a little singular, that among the French authors equal discordance exists on this subject; hardly any two of them naming the carpal bones alike. Bourgelat describes them as nine in number, but says little more of them, nor does he, if I remember aright, attempt to name them.

form * is the outer bone of the first row (*vide* 4), and articulates above with the external condyle of the radius; posteriorly with the pisiform; below with the unciform, and laterally with the lunare. The *pisiform*† (*vide* 1, 1) projects posteriorly on the outer side of the superior row, so as to give a greater power of attachment to muscles, and to raise the ligaments of the knee from compressing the tendons, but it takes no part in supporting the weight of the machine. It articulates with the outer and posterior part of the radius by one surface, and by another to the cuneiform. The *trapezoid* (*vide* 7) is the first and smallest bone on the inner side of the second row, and is situated at the posterior lateral internal part of the knee, articulating above with the scaphoid, below with the internal small metacarpal and a small part of the cannon, and laterally with the magnum. The *os magnum* is the middle bone of the second row (*vide* 5, 5), and is the largest of the whole; receiving above the scaphoid and lunare, and resting below on nearly the whole of the surface of the large metacarpal or cannon; articulating at the lateral internal part with the tarpezoid, and at the lateral external with the next bone. The third and most external of the second row is the *unciform* (*os unciforme, vide* 6); it rests upon the external small metacarpal, and in part upon the great metacarpal; and articulates above with the cuneiform, and laterally with the magnum. The carpal bones are covered with cartilage on their articular surfaces, and their non-articular are rough for ligamentary attachment, by which the whole are very closely connected together, allowing but little motion between any but the first and second row; yet some little is allowed between the whole, by which the jar is taken off when the limb approximates the ground. The capsular is a very extensive carpal ligament; arising from the inferior extremity of the radius, it passes to the first row of bones, to which it is attached; it then proceeds more loosely to the second, from whence it is continued on, investing the superior extremities of the large and small metacarpals. Within this, is secreted a large quantity of synovia or joint oil; and it is the escape of this, and the inflammation of the cavity of the joint, that makes deep wounds of the knee so dangerous. The carpal bones are liable to exostosis, or a throwing out of bony matter, on any violent injury, as blows, strains, &c.; but more particularly after the escape of the synovial fluid. There are also several layers of ligamentous fibres, some of which are applied to the

* As it is desirable that an uniformity of nomenclature should be observed among the teachers of anatomy, and as Mr. Stubbs, Mr. Coleman, and others, call this *cuneiform*, I have in this edition adopted their nomination.

† It is evident that this is very improperly called pisiform. It is called *os posticum* by Mr. Clark, and *trapezium* by Mr. Percival; either of which are more appropriate names, but the former is more particularly so.

bones; others are more loose, and stretch over the tendons to form annular bands. Each bone likewise has individual fibres connecting it to the bones with which it is attached, forming on the whole a most complex ligamentary plan, greatly strengthening the knee joint, and preventing a possibility of dislocation. The mechanical advantages of this assemblage of bones must be at once evident. Not only is the surface of attachment for ligaments, muscles, and tendons thereby increased, which is evidently favourable to motive power, and strength of connection; but it acts most advantageously as a spring placed between the two solid perpendicular arms of the radius and cannon, by which the jars or shocks of violent exertions are divided and distributed among the bones; or, as it were, carried over an extended and contiguous, but not continuous surface. That such is its principal use, we learn from the fact that in animals not designed for quick or long-continued exertions, as the ruminants, these bones are less numerous, and the joint altogether less favourably formed; as another instance of which inferiority, we may observe their os pisiformis is small and less prominent than in the horse.

The *metacarpus* (*os metacarpi magni, vide t, t*), or what is termed the *cannon* or *shank*, is formed of a large metacarpal bone and two small ones, which the French term styloids or perones. The *cannon* is a plain cylindrical bone with its two extremities rather enlarged, the superior of which articulates with the second row of the knee, and presents little correspondent risings and depressions with those bones. Anteriorly its head forms a tuberosity encircling the bone; posteriorly this is indented into two surfaces, receiving the small metacarpals. Its inferior surface is formed into two condyles, divided by an eminence, and articulates with the pastern and sessamoids. This articulation is admirably formed to preserve the utmost freedom of flexion and extension, yet to deny any lateral motion which would have detracted from the necessary great strength of the joint. By its three convexities being received into correspondent concavities on the upper surface of the large pastern bone, it forms a perfect hinge, and is so dovetailed as to be almost incapable of dislocation. The small *metacarpals* (*ossa metacarpi parva, vide u, u*) are placed one on each side of the posterior part of the cannon, each having a superior articulating surface uniting it with the carpal bones; each has likewise a surface of attachment with the cannon at its superior part, having a cartilaginous lining for this purpose, and being firmly tied in its situation by ligamentous fibres. They then pass tapering down less closely united, nearly two thirds of the length of the bone, where they terminate by an unattached point or little button.

The small metacarpals are attached to the large by a strong aponeurotic expansion, which will be described with the extremities; but they are more immediately connected with the large metacarpal bone by strong appropriate ligamentous fibres; yet not so closely but that they have some motion, and hence can descend, or in some degree yield, when pressed upon by the bones of the knee; and which appears one of their principal uses. The *internal* receives the weight of the trapezoid, the *external* receives part of the pressure of the unciform, and hence the spring in action can be wonderfully increased. But as the animal grows old, and his exertions become greater than his strength, so nature, sympathising with the general weakness of the parts, unites these bones by throwing out osseous matter between them; by which means, though their union becomes consolidated, their assistance as a spring is lost; for in old horses these bones are almost always united closely to the cannon. In young horses also, from the deposit being greater than the absorption, there is often a very considerable degree of bony union between them, and which forms what we term splent. As it is usual to raise the outer heel of the shoe, by which means an undue share of weight must be thrown on the inner small metacarpal; this has been thought to be the reason why splent is generally confined to the inner side; but perhaps this will not wholly account for this partiality to one side more than the other. There is more reason to believe that the natural form of the parts likewise gives a tendency to this; for we find that the weight of the carpal bone pressing on the outer small metacarpal, is divided between it and the cannon; but that the internal receives nearly the whole weight of the trapezoid. Under this view of the matter, which a careful inspection of the parts will shew to be correct, we cannot agree with those comparative anatomists who consider these bones are mere styloid appendages, intended only to keep up a harmonic connection between the horse and the digitated animals.

The *pastern.* The *large pastern bone* is called by some authorities *os suffragenis**. In conformity with human anatomy,

* Although I think that hereafter a more classic nomenclature will be appended to the veterinary vocabulary, and that great praise is due to those whose literary acquirements fit them for it, to attempt the clothing of the inappropriate and inelegant terms in a classic dress; yet as I would particularly encourage the study of the art among the great body of practitioners called farriers, so in the present state of the art I prefer to continue the more commonly received terms. For this reason I have not introduced *os suffragenis* to the exclusion of the old term of pastern. In fact, *suffrago* is equally or indeed more applicable to the hock. Columella, in recommending washing of the legs, desires that the hinder may be wetted to the hocks, "*Laventur pedes & deinde suffragineo:*" and he has again, "*equus suffraginosus,*" a spavined horse. For similar reasons to those above detailed, I have continued Stubbs' term of phalanges to these bones, although in some degree incorrect. I am aware that it may be argued, that, however appropriate phalange may be to the human digitated hand, which presents a phalanx (φάλαγξ) of bones, a cylindrical pile of single pieces can hardly deserve the appellation by even forced analogy. In the digitated animals, as the monkey, cat, dog, &c. a

Stubbs, and most comparative anatomists since his time, have described this as the first of four bones which form the *single phalange* by which the extremity of the horse is terminated, to which are added two small supplementals under the name of sessamoids. The great *pastern bone* or *first phalange* (*vide v, v*) is a cylindrical bone situated obliquely forward, and upon its length and obliquity depends the ease and elasticity of the motion of the animal: nevertheless, when these properties are very considerable, it requires too great an effort in the tendinous and ligamentous parts to preserve it in its situation; and thence very long-jointed horses are weaker and more liable to become strained than others. The superior surface of the bone receives the greater part of the inferior surface of the cannon; its posterior upper part articulating with the sessamoids, and its inferior with the coronet or small pastern. It has in front a rising portion, which, continued through the upper part, divides it into two articulatory depressions; the body is much smaller than either end, particularly than the upper. The inferior extremity ends in two rounded articulating protuberances, resting on articular depressions of the small pastern. It has a capsular ligament at each extremity, with lateral fibres to strengthen the junction; the suspensory ligament is likewise continued on it, by all which means it becomes firmly articulated.

The *sessamoids* (*ossa sessamoidea w, w*) are two small wedge-shaped bones, situated at the point of the fetlock, exactly opposed to the posterior and inferior part of the large metacarpus or cannon, and to the posterior and inferior part of the great pastern bone, with both of which bones they articulate very closely by depressions suited to the prominences of those bones, the upper of which, in some measure, rests a portion of its weight on them. They are placed side by side, with their thinner portion pointed upwards, and their thicker and more obtuse part below, by which portion they are firmly attached to the pastern bone by strong ligamentous fibres, as well as by the supensory ligament. Between them a hollow is left, invested with a bursal capsule, through which the flexor tendons slide with freedom and security. Small as these bones are, they are very important aids to progression, and the mechanism produced by them excites sentiments of admiration. Principally attached by their inferior portions, their upper are left in some measure free; and their elastic connections, to use the words of Mr. Percival (who has given the most luminous description of their use that has yet appeared) serve as a hinge to move on; "for every time they receive the impulsive force" (i. e. are

perfect phalanx of bones is equally met with as in the human, but in some degree degenerated. The thumb of even the monkey is but an imperfect antagonist to his fingers; while the fifth or dew-claw of dogs and cats is still less useful. The cloven-footed have two perfect and two imperfect phalanges; the whole-hoofed has one only: but to keep up the harmony of Nature, he has two imperfect but useful metacarpals.

pressed on by the metacarpal above and the general action below), "the sessamoids spring backwards and downwards in such a manner, that their apices describe the segment of a circle, while the lower (portions) simply turn upon their own axes." Acting in this manner, they are improperly said to "descend at every step the horse takes;" neither is their action perfectly described by the term *recede**, although the ingenious author who uses it was the first who described the action of these parts with precision and accuracy. The cessation of the impulsive force, i. e. the weight of the machine, necessarily replaces these bones in their former situation, and thus they may be considered as acting the part of *true springs* to this part of the limb, on which the elasticity of motion principally depends, and consequently the grace and ease of it also. Under these views, we are at no loss to account for the great elasticity produced by long oblique pasterns, which, operating on the angle formed between the two opposed members of this joint, places the sessamoids more under the centre of gravity, and enhances the spring of their return. Thus the improved breeds of horses, in which these peculiarities of formation are prevalent, are easy and pleasant; while the contrary formation of short upright pasterns, so common among cart and most low-bred horses, renders quick progression uneasy to their riders, and hurtful to themselves.

The *lesser pastern*, (*os coronæ*) or *coronet bone*, forms the second phalange, and receives the great pastern, and is peculiar in having its largest extremity below; it presents an inferior, an anterior, and posterior surface; but cannot be said to be square (*vide x, x*). Its anterior eminence is received into the anterior inferior depression of the large pastern; and posteriorly the upper surface is formed into two depressions, receiving the pulley-like surface of that bone. Inferiorly it terminates in two similar pulley-like surfaces, and an anterior depression corresponding with the anterior eminence of the coffin bone. It likewise articulates with the navicular bone, by two depressions which receive the navicular prominences when the joint is fully extended. This bone at its upper extremity receives the capsular ligament of the pastern, as well as strong ligamentous fibres on each side: inferiorly, besides its capsular, it receives the ligaments of the navicular bone, as well as an appropriate ligamentary junction with the coffin.

The *coffin bone* (*os pedis*) is a very peculiar one, and forms the third phalange (*vide y*) In shape it corresponds with the hoof, which, with its appendages, it fills: in structure it is very

* "In consequence of forming the back part of the large pastern joint, and articulating with the lower and posterior part of the cannon, they contribute very essentially, by always *receding* whenever the foot comes in contact with the ground, to act as a spring to the animal, and to prevent concussion."—*Professor Coleman on the Foot of the Horse*, vol. ii, p. 24.

porous, having its bony fibres perpendicularly placed so as to give it a rough linear appearance, particularly at the lower part. When viewed in front, an eminence is seen at the upper part to which the tendon of the extensor pedis is attached: its lateral parts are not so high, but project farther back, and form two lateral processes, but which are not always very distinct. In the lower of these processes, or between the two, a considerable branch of an artery is seen passing from the posterior part, and which traversing around two thirds of the semidiameter of the bone, is then ramified within it and its laminæ. There is likewise usually a lower lateral groove, from which a branch of this upper trunk passes to furnish the under surface of the bone. Above these processes is a concavity which receives the lateral cartilages of the foot, and gives attachment to the capsular ligament likewise. Round this outer surface of the bone are placed the sensible laminæ, which indenting themselves between the linear asperities, greatly strengthen their attachment. The inferior surface has two concavities; the anterior of which has no foraminæ, and is covered by the sensible sole: the posterior surface appears hollowed out of this, and a rising line shews the extent of attachment of the perforans flexor tendon, which strongly implants itself into the remainder of this surface. Two grooves that lodge two considerable arteries indent a part of this concavity; and immediately under the flexor tendon, ligaments are also attached to it. Above this concavity is seen an articulatory narrow surface for the reception of a correspondent one on the navicular bone. Beside the foraminæ particularized, numerous smaller ones perforate the bone in every direction, giving passage to nerves and blood-vessels. The upper surface of the bone presents two articular depressions divided by a rising line continued from the anterior eminence, and which are covered with articular cartilages. *See Plate* IX, *where this bone is represented.*

The *navicular* (*os naviculare*), *nut*, or *shuttle bone*, is situated at the posterior part of the coffin, to which it is articulated by a surface just described; its upper surface forms a continuation of the articulating surface of that bone, by which they jointly receive the broad extremity of the little pastern. It is, as it were, laid upon the flexor tendon, which passes up over its posterior edge (*vide Plate* IX). These parts will be more particularly considered when we describe the feet (*vide z, z. y, y*).

The Posterior Extremities.

These differ much from the anterior, not only in the strength of the parts, but in the length and direction of the bones forming them.

The *femur* (*os femoris*), or *thigh bone*, is the largest, thickest, and strongest bone in the body. It is, however, short in the horse compared with most other animals, and its surface exhibits risings, asperities, and indentations for the attachment of powerful muscles, unequalled in magnitude by any other quadruped. It does not, as in the human, appear beyond the parieties of the abdomen, but, being hidden within the skin, is apt to be overlooked, and the next bone is therefore, in horseman's language, called the thigh. From its upper extremity, the *cervix*, or *neck* (*vide h*), bears the *caput*, or rounded *head*, with which it is articulated with the pelvis by means of the *acetabulum*. This neck is not long, as in the human, and the head is placed nearly at right angles with the body of the bone, by which formation its motions are principally confined to flexion and extension. Within the head is a cavity, giving origin to a flat ligament, but improperly termed the *round*, which is implanted in the acetabulum, and thus retains the head of the bone very strongly in its situation: below the head is a linear asperity for the insertion of the capsular ligament; and from the inner part of the cervix a ridge extends down, in the middle of which is a process (*vide l*), called the *internal trochanter*. On a line with the caput or head, is a large depression receiving the tendons inserted into it. From this, the bone is stretched up into a very tall epiphysis (*vide i*), called its *great trochanter*, which is curved forward, and by its form affords a favourable attachment for the gluteus maximus: below, there is a very considerable tuberosity, that has been called the *small external trochanter*, which in the human, instead of being placed laterally, is situated almost behind: below which again, there is on the outer side a curved process, peculiar to the horse, called the *lateral external trochanter* (*vide k**). The body has two flattened surfaces, one situated posteriorly, the other at the lateral and external part: usually about the middle, is a foramen for the transmission of the medullary vessels. Its inferior extremity terminates in four large condyles. The anterior unite to form a surface on which the patella slides (*vide m, m*): the posterior (*vide n, n*) have a cavity behind them in which the crural vessels pass protected, surrounded by fatty substance. The femur is not, as in the human, curved outward, but is straight in its body, though oblique in its direction, being carried forward, so that the patella falls within the line of the haunch, at an angle of about forty-five degrees. The upper extremity articulating with the pelvis is called the *whirl* or *round bone* by farriers; and is held in its situation, first by the flattened ligament we have described, next by a strong capsular one, and, lastly, by the large muscles surrounding the joint: nevertheless, powerful as is this articula-

* Every part of the os femoris of the horse betrays marks of the great powers required of it. This process, which gives attachment to the vastus externus, fascia latæ, and m. f. glutealis muscles, and is wanting in the ruminants, as well as the greater number of quadrupeds, is called by Stubbs the protuberating part of the linea aspira.

tion, this bone is now and then dislocated; though a violence of such magnitude more usually fractures the head from the neck of the bone. Like most of the other bones, it is subject to exostoses. In the dog, cat, and many lesser animals, whose limbs are capable of diversified motions, a small bone is commonly attached to the external condyle, but which is wanting in the horse.

The *patella* is called by farriers the *stifle* (*o, o*); it is nearly angular, and has an anterior rough concave surface to which ligaments are attached, and an interior which is cartilaginous, adapted to the convexity of the femur and tibia. The patella has some of the tendons of the strongest muscles of the thigh inserted into it, and which are from thence continued over to the tibia. This bone must thus greatly assist the motions of the leg, and give these muscles much power. It is attached in its situation by the strong muscles implanted into it above, and a ligament from its lower part, united with an expansion of the rectus tendon stretched over and fixed into the depression at the head of the tibia.

The *tibia* is a large bone situated within that part called the thigh, though, speaking with analogy to the human, it is properly the leg (*vide q, q*). It is formed of a large epiphysis called its head, and a small attached pyramidal part called the fibula (*vide r, r*): which is altogether wanting in the ruminants, while the dog and cat possess a very perfect one, by which the motions of their hinder limbs are diversified, and the surface for the digitated lower portion increased. Another epiphysis forms its lower extremity, which is furnished with articulating protuberances termed *malleoli*. This bone is placed obliquely backward, as the femur is obliquely forward; forming with that bone an obtuse angle. The superior extremity has an anterior flat protuberant surface receiving the patella in the flexions of the limb, and having ligaments inserted into it: it has likewise an upper surface with two slight articular fossæ separated by a rising edge, which enters between the condyles of the femur. On this likewise the semilunar cartilages are placed (*vide p, p*), and in a hollow formed for this purpose are lodged the cervical ligaments of this joint: and behind run the popliteal vessels in an appropriate cavity surrounded by fat. The body is nearly triangular, the anterior angle of which is called its spine, and which forms the human shin; and on this body is seen a foramen for the transmission of the medullary vessels. The inferior extremity is formed into three considerable protuberances, and a lesser one, corresponding with the pulley-like surfaces of the astragalus; the risings of the one being received into the depressions of the other, so as to form the strongest possible articulation.

The *fibula* in the horse is nothing more than an epiphysis to the former bone, uniting with it by age. It appears more designed to keep up that beautiful connexion we observe throughout animated nature, than for any great use in the machine. It is attached by a cartilaginous surface to the lateral superior and posterior part of the tibia, with its base upwards and its point directed below (*vide r, r*); reaching a quarter of the length of the tibia, to which its lower point is attached.

The articulation of the tibia with the femur presents a glenoid cavity, consequently this joint requires strong ligaments, or a dislocation might take place, and which on a superficial observation seems very probable: but so perfect is the mechanism here displayed, that I never heard of an instance of it. The *semilunar cartilages*, by being thick on the outside and thin in the middle, increase the depth of this otherwise superficial joint; but the principal strength of the articulation is derived from its ligaments, which are a capsular, lateral, and crucial. The capsular is extensive, and completely invests both extremities of the bones forming the joint. The crucial ligaments arise within a depression in the articular surface of the tibia, which crossing each other are inserted into the posterior part of the condyles of the femur. The lateral ligaments are an external and internal, arising from the condyles of the femur, and inserted into the head of the tibia.

The *tarsus* or *hock* is, in the horse, an assemblage of six bones (*vide Skel.**), forming a most complex and important joint, and so intimately united as to appear a solid mass.

The *astragalus* is the largest of the tarsal bones, and presents a very irregular figure (*vide* 3, 4. 3, 4). Its upper and anterior surface is pulley-like, having two remarkable circular risings with an intermediate depression, which articulate with the malleoli of the tibia. Posteriorly it has several surfaces of attachment with the calcis, receiving the eminences of that bone into considerable depressions: inferiorly it has similar surfaces for articulation with the great cuneiform, upon which it rests; and posteriorly at the lateral external part it has a surface of attachment with the cuboid. The *calcaneum, os calcis,* or *hock point* (*vide* 1,2.1,2), is placed nearly behind the centre of the joint, and into it the tendo achilles, or twisted tendons of the gastrocnemii muscles, are inserted: the longer therefore is this process, the longer is the lever these muscles have to act by; and a very slight increase or diminution in the length of this bone must make a very great difference in the power by which the motions of the joint are operated. It is by this tendon, that when the animal has inclined the angle between the cannon and the tibia, or, in other words, when his hinder extremities are bent under him in a gallop, or one of them in the trot, that he is enabled again to open it. The calcaneum is not placed so as to rise exactly from the centre of the joint,

* Now and then, by a division of the internal cuneiform, there are seven bones.

but rather externally; and this formation leaves a space on the inner side, by which the flexor tendons of the foot, with the vessels and nerves, pass protected from pressure: inferiorly it articulates by a concave cartilaginous surface with the cuboides, and anteriorly it is received into the depressions of the astragalus. The remaining bones are more wedge-like, and only serve to increase the surface of attachment; one of them is called os cuboides, the other three cuneiform. *Cuneiform magnum* (*vide* 5, 5), or great wedge like, is placed under the astragalus, articulating with it by a concave, and inferiorly by a convex surface; it rests upon the middle wedge-like: posteriorly its internal, as well as part of its inferior surface, articulates with the cuboid, which Mr. Stubbs calls navicular; it has likewise posteriorly and inferiorly a small surface of attachment with the little cuneiform. Immediately behind this, on the outer side appears the *cuboid* (*vide* 6): by its cartilaginous surface it articulates, superiorly, with the inferior concave surface of the calcaneum, receiving the inferior posterior edge of the astragalus, and resting inferiorly on the external small styloid or metatarsal bone, and part of the cannon: it has likewise two surfaces of attachment with the cuneiform magnum, and one with the medium. The *cuneiform parvum* or *internum* (*vide* 8) is situated most posteriorly on the inner side, immediately under the posterior internal part of the cuneiform magnum, and over the internal small metatarsal bone. It articulates by a small upper surface with the next bone, projecting rather forward, to rest partly on the cannon; but its principal portions articulate with the great cuneiform superiorly, and with the internal small styloid or metatarsal inferiorly.—The *cuneiform medium* (*vide* 7, 7). The greater part of this bone appears on the front of the hock, articulating by its superior cartilaginous surface with the great cuneiform, and inferiorly with the whole head of the cannon, or great metatarsal. It is slightly triangular, with its acute part pointed posteriorly, and articulates by a posterior lateral internal surface with the cuneiform parvum, and at the lateral external part with the cuboid.

Though the bones of the hock have all cartilaginous surfaces, yet they have but little motion except between the tibia and astragalus, and this is confined to flexion and extension. Each of them has peculiar plans of fibres, stretching from one to the other in every direction, by which means they are individually joined together. The capsular ligament arises from the inferior extremity of the tibia, stretches backward to insert itself into the calcaneum behind, and before into the ridge of the cannon; besides which, the lesser bones have also peculiar capsules. From the malleoli on each side, arises a strong common ligament extending laterally over the joint, firmly fixing itself to the bone in its passage: a plan of its fibres forms likewise the annular ligaments, under which the tendons insinuate themselves in their passage. A short plan also of strong fibres extends from the inner and outer sides of the tibia into the astragalus; and likewise a very strong posterior one from the calcaneum passes over the cuboid and cuneiform medium, which, uniting with the small metacarpal and posterior part of the cannon, covers all the back part of the joint. The inflammation of this ligament occasions the disease called curb.

The structure of the hock alone bespeaks its importance; and, when it is observed, that in the horse it is peculiarly complex, and its component parts more numerous than in most other quadrupeds, we are led to consider it as greatly assistant to the peculiar properties of this animal, which are that of immense strength, united with great elasticity and capability of rapid and long-continued motion. The same necessity of adhering to the parallel of human anatomy, both in consideration and nomenclature, before remarked on, is here the cause of some confusion, and great misapplication of terms. The vast dissimilarity in parts between those animals, who like the horse, by having elongated, tarsal, and metatarsal bones, walk on all the parts below the hock, and man, whose tarsus rests wholly thereon, must be at once evident. The human tarsus, which is called the instep, is composed of seven bones, and forms a right angle with the tibia, resting on the ground: but, instead of preserving a plane line of direction, they are arched, to give firmness and to favour elasticity. In the horse, the two central cuneiform bones are united into one. His navicular bone (as so called by Mr. Stubbs, but now more appropriately named cuboid) has little resemblance to a boat; nor is the one beneath it more like a wedge. In situation, the tarsal bones correspond as little to the hock of the horse, as they do in shape; and it has been very justly observed, that the cuboid, astragalus, and calcis, are the only tarsal bones that answer to the appellations they have hitherto received.

The *hock of the horse* will bear exactly the same reasoning applied to it, which has been already applied to the carpus or knee. It is extended to give solidity and extent of surface for the attachment of tendons and ligaments; but, like the knee, the assemblage of bones is more particularly favourable to resist the effects of shock; for the weight carried downward by the tibia is here received, not by one opposed bone only, and that in a right line with itself, but, being itself oblique, it transmits its impulse not in a direct but in an angular direction, and not to one bone alone, but the effort is communicated and dispersed through seven, whose impulses thus directed, without concurrent jar, are again given to the great metatarsal bones, and by them continued downwards. Thus, in the ox and sheep, whose motions are less agile, instead of six bones there are but four; and a peculiarly formed and perfect hock seems essential to those animals who are intended not only to gallop, but to perform all their cadences with perfection. Not only does the hock receive the superincumbent weight, but it is calculated to extend the general motive powers by the extension of the process of the os calcis, into the point of which very powerful tendons implant themselves, and thereby act with all the advantage of a lever: nor will it be difficult, under this view, to perceive that the increased or diminished length of this process, or, in other words, that broad or narrow hocks are favourable or unfavourable to progression.

The complexity of this joint, and the great powers required of it, renders it very liable to disease and derangement; and that more particularly in those horses who are naturally disposed to set themselves, or are taught to throw their weight on their haunches; for in them the greatest stress is then laid on this joint: whereas, in the mode of riding usually practised in England, the weight is more thrown on the shoulders and fore limbs; hence with us, these are the parts that generally first fail; but, in France, and the whole of what is called the Continent, where horses are taught to go much on their haunches, this joint is more liable to suffer, and spavins are equally plenty as with us.

The rest of the bones of the hinder extremities are similar in nature and number to those of the fore; nevertheless, there are some small variations (*see Skel.*). The *large metacarpal bone*, or cannon, is longer, and altogether larger than that of the anterior extremity; it is articulated above with the cuneiform medium, and in part with the cuneiform parvum and cuboides; and below with the pastern and sessamoids. The *external small metacarpal* is considerably larger than the internal, articulating superiorly with the cuboides, and laterally with the cannon. The *internal* is less, articulating above with the little cuneiform, and laterally with the internal edge of the cannon; in other respects they resemble the anterior.

The *pastern*, or first phalange, is longer than the anterior, and its situation is less oblique: it resembles in other respects those before. The *sessamoids* are two, and do not differ from those already described. The *coronary bone* partakes of the form of the pastern, being likewise less oblique in its position, resting more on the coffin, and less on the navicular than in the front; thus, in the posterior coffin, the fossa of articulation is deeper; the reason of which appears to be, that, as a horse has frequently to support his whole weight on his hinder extremities, so it was necessary that these bones should be opposed to each other in a more direct line, whereby they acquire strength; the loss of elasticity occasioned by which, is made up by the formation of the hock: and as, in action, the natural inclination of the posterior extremities must carry them much under the animal, to gain the common centre of gravity; so, had these articulations been equally oblique as those before, the navicular bone would have been too much pressed upon: add to which, that in throwing a horse on his haunches, his fetlocks would have been brought to the ground; but in the present formation, the bony pillar takes off much of that stress that would otherwise have been forced upon the tendons.

Of the Skeleton, considered mechanically.

It is evident, that the progression of animals depends principally on the form and direction of the parts forming the base of the machine; and we shall find that the mechanical structure of the skeleton is admirably adapted for giving ease and celerity to motion. The horse presents a quadrilateral figure, with four supporting pillars to an inclined cylinder*, which is not placed in equal lengths upon these supports, but has the head and neck projected forwards: which is again counterpoised by the additional weight in the hinder parts, so as to leave the line of direction still near the centre of the whole. The length of a cylinder may be such as not to support its own weight; Nature has, therefore, wisely limited the length of the spine in animals, and their general growth: hence, *cæteris paribus*, a short-backed horse must be stronger than a long one; it is likewise upon this mechanical principle, that smaller animals can carry proportionably more than larger. In the bony pillars forming the legs, scarcely any of the bones are perpendicularly opposed to each other; yet it will be found, that a perpendicular from their common centre of gravity falls nearly in their common base: by which means they are supported as firmly as though their individual axes had been in a line perpendicular to the horizon. It likewise greatly increases our admiration of this mechanism, when we observe the contra-disposition of the angles between the fore and hinder pillars or legs. Had these angles existed in the same direction, the body must have been precipitated forward or backward; but each angle opposing a counteraction to the other, the machine is firmly sustained between them. In progression, also, this contra-position of angles must alone destroy all that coincidence between their mode of action, which St. Bel so much insisted on:—"It will be seen what will be the situation of the limb the instant before the motion of the body; the curve described by the hind legs will necessarily be reverse to that delineated by the fore; it will, in the former case, be concave towards the horse, while in the latter it is convex." The fore and hind limbs present, beside, other distinctive marks; indeed, altogether a different character. Less angular, they appear more in the true character of pillars, and are purposely formed to receive the weight impelled on them by the hinder limbs. This weight they sustain until their elevation is forced upon them by the central tendency of the whole, and the impulsive force from behind. The hinder extremities, having less weight on them, and at no time bearing an increase of pressure as the fore do, from the impetus communicated from behind, are much more angular, and, by being thrown into a backward direction, afford the necessary means for propelling the body forwards. Having also this important office almost wholly dependent on themselves, as that of sustaining it is principally confined to the fore legs, so they are necessarily much stronger, both in their bony and in their muscular apparatus; by which their angles can be advantageously opened and closed with effect in progression. The angular construction of the limbs is greatly favourable to their elasticity also. Had they been perpendicularly opposed to each other, there could have been but little ease or quickness in motion; every exertion would have been a jar, and every increased effort a luxation or fracture. This deviation from an upright position in the bones, must ne-

* The human is a perpendicular body, supported by two pillars; the spine of which appears as two pyramids joined into one common base; and though no where straight, is so ingeniously contrived, that a perpendicular from their common centre of gravity falls into their common base. The human, by this alteration in position, becomes a much more complex machine, than the brute.

cessarily, however, have powers to correct it, which is done by muscles; and wherever the angles are found greatest, the muscles will be found strongest. This muscular exertion to counterbalance the angular inclination, occasions fatigue, which is the reason why one posture continued for a length of time gives a sense of pain: the set of muscles immediately engaged becoming weary, the animal is obliged to call another set into play; which change is necessarily more or less frequent, as the animal is weaker or stronger. The extent, therefore, of the action of parts is the produce of their length, direction, and the different angles they are capable of forming; the force arises from the direction, in combination with the agency of the muscles. The repetition of the action is dependent on the muscles alone; but as the original action arose out of the length and direction of the parts, so it will be evident, that, in every subsequent repetition, it will be more or less extensive, as these were more or less perfect in their formation, even though the muscular exertions should be the same; hence some strong animals cannot move so fast as weaker ones, as the cart horse and racer, or the greyhound and mastiff. The power of muscles is increased or diminished as they are situated near or more distant from the centre of motion: thus, the bones are usually so placed, as to give the muscles this advantageous position; some are formed into angles, as the femur and tibia; others into processes, as the olecranon, calcaneum, &c. Every change in the position of a body must occasion a similar one in the centre of gravity: in order to preserve which, the feet are changed to form a new centre for the moving machine, which forms what is termed progression: the different modes of conducting which, and the degrees of celerity, are called *paces*.—*See Paces.*

Sect. IX.

SYNDESMOLOGY

COMPREHENDS all the appendages to bone, as the *cartilages, periosteum, medulla, ligaments,* and *synovia.*

Cartilages may be divided into three kinds; *articular, non-articular,* and *temporary.* Considered generally, cartilage (familiarly called *gristle*) is a smooth, minutely fibrous, white, uniform, elastic substance, harder than most other parts, but less so than bone, with little vascularity; and having a membrane reflected over it called *perichondrium.*

Articular or *obducent cartilages* furnish the extremity of every articulated bone, by means of a layer or tip, which is thickest at the point of extreme pressure. By these means, the bones slide easily on one another, and the elasticity of the interposed cartilage prevents the effects of that concussion, which must otherwise take place between two such inelastic bodies.

The *nonarticular cartilages* are divided into the attached and unattached. The *attached* are placed on the ends of bones not articulated, as the spine of the ilium, sides of the foot, ends of the sternum, supercilia of cavities, &c. They are likewise interposed between bones immoveably joined, as the symphysis pubis. The cartilages of the ribs are of this kind, and are of great use to give flexibility to parts that would otherwise have but little. The septum narium is an attached nonarticular cartilage, serving the purpose of bone. The *unattached* are such as sustain parts without adhering to any bone; those of the ears and larynx are familiar instances. A variety exists, which may be named *cartilago ligamentous,* partaking of the properties of both cartilage and ligament; as those between the bodies of the vertebræ, &c. Bones attached to each other by this union, as the splent bones, the ulnæ, and fibulæ, are fortified from all dislocation, yet enjoy the advantages of a limited joint, and possess sufficient motion to form a spring, and to resist the effects of concussion.

The *temporary cartilages* are those of which the ends of bones are formed in young animals, being very vascular, that they may be easily absorbed, and bone formed in their room. The description of individual cartilages will appear in the progress of the work, therefore we shall not particularize them here.

The powers of life in cartilage, though small, yet are fully evinced by their liability to ossification, and which appears more common and universal in those of the horse than of any other known animal; there being very few cartilaginous parts in him that have not been found ossified, and to which disposition the stiffness of age and want of elasticity are principally owing; the elasticity of the cartilages decreasing with the progress of ossification. The ulceration of cartilage, from its slight vascularity, is necessarily very slow, as we witness in its attack on the nasal septum, and in the lateral cartilages in quittor: but from some connection with the vascular parts around, it is much quicker at the ends of bones where an opening into the joint has been made. It is not ascertained that true cartilage is ever reproduced: but a cartilago ligamentous substance is substituted sometimes by healthy granulations.

The *periosteum* is a general investing membrane to bones and their appendages, receiving different names as it covers different parts; that investing the skull being called *pericranium;* that stretched over cartilages, *perichondrium;* and when it covers ligaments, *peridesmium.* The uses of the periosteum appear to be to circumscribe the form of bones, and to protect them by its tenseness. It is also the medium whereby they are furnished with their vessels. Periosteum, in a healthy state, has but little sensation; but, like some other parts, when diseased it becomes very sensible.

The *marrow* is a soft, oleaginous or fatty matter, deposited in the cancelli of bones, particularly of the long ones, by means of little sacs, which do not communicate, or the marrow would gravitate: and which, as keeping the unctuous matter distinct from the bones, convince us, that the use of the marrow is not that of preventing brittleness in these organs. The medullary vessels secrete the marrow within these cells; and which secretion, being in itself wholly inorganic, confutes the foolish notion of the exquisite sensibility of the marrow. The real *use* of the marrow is undoubtedly, like that of the fat, to prove a resource to the constitution against occasional want. During the hybernization of animals, the fat and marrow become alike absorbed for the wants of the frame during torpidity. Thus, long fasting and emaciation waste it; whereas, in fat animals, the bones are found full of it.

Ligaments are dense, white, fibrous substances, of great tenacity; either cordlike as tendons, or expanded into more plane layers. In still greater tenuity, it becomes a common membrane in every part of the body; but is more particularly appropriate to bones, and hence generally described with them. Ligaments are generally inelastic: there are however exceptions, as the cervical and the suspensory of the extremities. Some of them partake of the nature of cartilage, and are hence called cartilaginous ligaments, being hard and little vascular. Ligaments divide themselves into connecting, suspensory, and capsular. *Connecting ligaments* are endless in form, strength, and situation. They are usually found stretched from one part to another. Thecas, aponeuroses, and fascias are modifications of connecting tendinous ligaments. *Suspensory ligaments* suspend parts, as that of the head of the femur suspends it within the acetabulum. The ligaments of the liver suspend it also in its situation; and those which attach the sessamoid bones to the fetlock joint are likewise of this kind.

Capsular ligaments surround the ends of articulated bones, and form the joint into a complete cavity; which appears a principal end in their formation: for they are frequently of considerable length, often of no great thickness, but are always impervious. By the density of their structure, and by their inelasticity, they must, however, add to the strength of the joint, and assist in preventing dislocation. Capsular ligaments are not very sensible without, but they are extremely sensible and vascular within; and secrete from their inner surface a mucus called synovia. It is from the sensibility of this inner surface, that the inflammation produced on wounds into the cavity of a joint is so extreme. After the escape of the synovia, the whole surface of the joint, which is very large when expanded, receives the stimulus of the external air, as well as suffers attrition, and becomes irritated and inflamed to the highest degree. (*See wounds in joints.*) The individual ligaments will be described with the parts they belong to.

The *synovia* is a fluid popularly but erroneously termed *joint-oil*, for it is simply mucilaginous, and not unlike the white of an egg. It appears to be secreted by the vessels of the capsular ligaments. Its lubricating use is very great; for without it, the attrition between the articulated ends of bones would most painfully prevent motion: but by this slippery medium they readily slide over each other, without pain or difficulty.

This fluid may be secreted in undue quantities, and then forms capsular dropsy, which is not, however, frequent in the horse. Bursal dropsy, under the name of windgall, is sufficiently common.

Sect. X.

MYOLOGY.

MUSCLE is that part in an animal we term flesh, in distinction from skin, gristle, bones, &c.; and the phenomena it exhibits are so universal, that it is probable it exists in every animal, though we are not so easily able to detect it in some as in others. Muscles appear composed of reddish bundles of fibres laid alongside of each other, divisible into lesser fibrillæ of the same figure, but the ultimate division of which it is impossible to trace*. When these bundles are connected together into a determinate form, it is called a muscle: and as the motions of an animal are very various, and the circumstances under which they are brought about equally so; the peculiar shape these motive masses take on, is as varied†. Muscular fibre is spread over the body, and it has been very judiciously remarked that our ideas of it are probably too much limited‡: thus, it constitutes a principal part of all the viscera, and enters into the composition, it is probable, of many membranes; and, in fact, forms the bulk of the body in most animals. What is, however, generally understood by a muscle, is a distinct body, having its determinate parts. The vascularity of muscles is extreme; in the red-blooded, their colour being wholly derived from the quantity of blood within them. But from the circumstance that many muscular parts are colourless, red blood does not seem essentially necessary to muscular phenomena. Their ultimate power, however, is connected with blood

* The muscular fasciculi are not of uniform size; in some muscles they are larger and coarser than in others: they are particularly so in the masses of the glutei. In some specimens in the same families, the muscular texture is universally coarser: as we see in the grain of some beef and mutton. Bull-beef is as obnoxious for this, as for the rankness arising from spermatic diffusion. The *direction* of the fibres is not always the same, which has given rise to the division of muscles into rectilinear or straight, radiated or in rays, compound or intersecting each other, and penniform when the fibres branch out in an angular direction like the plumes of a pen.

† Muscles, from their infinite variety, are named according to their form, as triangularis, trapezius, &c.; or after their course, situation, and attachments, as recti, subscapularis, sterno brachialis, &c.: or their uses, as flexors, extensors, abductors, adductors, &c. &c. Each is again divided into its origin or head; its body or belly; and its insertion: but this admits of latitude, as these parts change by the action of the muscle itself under various circumstances.

‡ We must not conclude those parts only as muscular that are of a red colour; for the muscles of insects, of fishes, and of many fowls, are white. The iris, the stomach, the bladder, and the intestines, whose contractions are powerful and distinctly muscular, want the characteristic hue of red flesh. The hydatid is a transparent bag; yet, when put into warm water, produces motion and contraction, and must therefore be supposed muscular.

in general; for when deprived of a part of it, they become weak; and if it be wholly lost, they will wither and die. On the contrary, by exertion, which is but another term for increasing their vascularity by forcing more blood into them, they increase in size, in strength, and colour. The *condition* of a racer or hunter, is that admired swelling of the muscles gained by exercise, under the name of training, contrasted with the plumpness arising from interstitial matter. From the extreme vascularity of muscles, their living powers are very great. They are also plentifully supplied with nerves; yet, from experiments made on the living subject, they are not found so sensible as has been supposed. Their lymphatics are also plentiful. Thus furnished, they have the general living powers of all other parts in a high degree; and, besides which, they own a power peculiar to themselves, whereby they contract and shorten at pleasure; during which contraction, they become thicker and harder, but without actual increase to their bulk. This power is dependent on the will, in the *voluntary* muscles, and in the *involuntary* on appropriate stimuli, as blood stimulates the heart, and light the iris. The contractile power of these motive organs has been for ages a subject of wonder and dispute: this disposition to be acted upon by stimuli has been called their *irritability*, and exists after death; and likewise remains in them on their removal from the body, whence it must be inherent in them*. If, however, the nerves going to voluntary muscles are tied, we lose our power over them, they become paralytic, and incapable of obeying the commands of the will; hence it would appear, that nervous influence is the proper stimulus to voluntary muscles. Neither can the will force the muscles to contract beyond the capacity of their physical powers; and hence, after exertion, they become fatigued, and at last paralytic†.

Muscles are called voluntary and involuntary. *Voluntary muscles* are such as are immediately under the influence of the will, as those of the arms, legs, eyes, mouth, &c. *Involuntary mus-*

* It is to these contradictory facts, that our total ignorance of the phenomena of muscular contraction is principally owing: for as the muscles can contract, not only after what we understand by death, but also when cut off from all communication with the brain and nerves; so it would appear, *à priori*, that their contractile powers were independent of them. But so far is this from being the case; the brain and nerves are not only the medium through which we operate on the voluntary muscles, but they have a paramount influence on the voluntary and involuntary also; as we see in tetanus, epilepsy, &c., which we are assured, from incontrovertible facts, are irritations on the sensorium, or its adjuncts the nerves. The exertions of a phrenetic horse, and of a maniacal man, are infinitely greater than either are capable of under full health; and which are alone dependent on the increased excitation afforded to muscular contraction by the brain and nerves. This will also explain why horses when vicious, or when running away through fear, exhibit such uncontrollable efforts.

† It is by this influence over the contraction of the muscles by nervous excitement, that various other phenomena also can be readily explained. It is

cles are such as are not under our guidance, and whose functions go on without controul, as the heart, the respiratory and digestive muscles. A third sort may be added, which partake of the nature of both, and are thence called *mixed:* such are the respiratory muscles, whose action we can increase or diminish, but cannot wholly suspend. Muscles acquire a power of acting, dependent on their situation, and according to their fixed point; and as these points can be altered by the muscle itself, their actions become very various, of which diversity some appear to be more capable than others. Voluntary muscles have usually antagonists, whereby the perpetual tendency to contraction is counterbalanced; they are likewise commonly invested by a cellular or membranous covering, which in some instances is very dense, called *fascia,* whereby they are bound down and assisted in their action.

Tendons.—To the generality of muscles, particularly to those ending in bones, is added another part called tendon, of a very different texture, being an insensible, inelastic, fibrous substance, of extreme tenacity. The forms of tendons differ, as round, flat, or extended. When such extension is thin and considerable, it is called an *aponeurosis.* With still greater extension and tenuity, it becomes *fascia.* The size of the tendons is not proportionate to that of the muscles they belong to, and some muscles are altogether without any. Tendons are but little vascular, nor can we easily detect any nerves in them; their powers of life are consequently small, and from being so little vascular, they are hardly putrefactive; nor are they at all sensible but under inflammation; when they, in common with some other insensible parts, as the periosteum, become sensible either by themselves; or probably by their granulations*. The thecal membrane covering them becomes, when injured, highly sensible, which will account for the extreme pain and tenderness consequent on sprains. Their absorbing system is also trifling; under which deprivations their diseased and reproductive processes are necessarily slow†; nevertheless, both in the ass and dog, a divided tendon has reunited; and the tendon Achilles in man also. The uses of the tendons

thus we learn why the relative forces of large and small muscles are not in the ration of their bulk; for some small muscles are much stronger than larger ones, and some small animals than those of greater magnitude. The exertions of the blood horse are, comparatively with his bulk, much greater than those of the cart horse; because the nervous excitement of the one is greater than the other.

* When the extensor tendon has been exposed in broken knees, if it be pricked or irritated, the animal immediately evinces much pain.

† Mr. Percival has a very excellent practical remark on the tedious process of ulceration in tendons: "So that if matter be poured forth under a tendinous fascia, unless we discover its presence in time, and give it free issue by puncture, it will burrow among the muscles, or other soft parts, and produce extensive mischief; whereas, had it been collected under the skin, ulceration of the integument would have readily discharged it, without any surgical assistance."—*Lectures,* p. 201.

are very important: they combine increased strength with diminished bulk; hence are peculiarly appropriate to the muscles of the extremities, where symmetry of parts and freedom of motion are required*. Tendons have a general covering from the cellular membrane; and an individual *theca*, or sheath, is appropriated to many others, by which they are prevented from displacement during action. At the extremity of most tendons, inserted into moveable parts, or between the tendons and their thecal appendages, and sometimes at the points of contact between two tendons which move on each other, is situated a *bursa mucosa*, or tendinous capsule, containing a lubricating mucus, of the nature of synovia. (*See Bursalogy.*)

An accurate description of the individual muscles of the horse would prove by no means an easy task; particularly so, as his general anatomy has but lately made any progress among us. Neither would such a knowledge of many of the muscles do much to advance the art of curing his diseases, which is the great end intended in anatomical pursuit: but it is very different with the myology of the extremities, where the minutest part is of importance, and where an individual knowledge of each muscle is necessary to the veterinarian. On these I have bestowed great labour and attention; and they, I believe, will be found correctly and fully described. Nor have I wholly neglected the others: on the contrary, I have at times gone over them all by dissection; yet not perhaps with that perfect correctness, necessary to class, divide, and name them arbitrarily, as I have those of the extremities. Unwilling, therefore, to run any chance of palming error on the student, by giving a mutilated myology, I have presented Bourgelat's division and nomenclature of the muscles of the head and trunk; reserving to myself the liberty (which, it will be observed, I have very frequently taken) of correcting in the notes what I conceive to be erroneous. By this means, I hope that the table of muscles will be, at least, more perfect than any plan yet made public. I may here add, that I would not advise any student, who dissects these organs, to trouble himself with reference to numerous authors, or he will probably, what with different nomenclatures, a variety in the mode of description, and perhaps the division of one muscle into two or three portions, become so bewildered, as to turn with disgust from the rugged task; but I would recommend him, if at all advanced in anatomy, and alert in the process of dissection, to make use of no reference; but carefully to mark every muscle, with its origin, attachment, insertion, with his own ideas of the uses, and afterwards to compare this with the authors most to be depended upon.

* What would have been the form of the limbs in the racer, light, elegant, and flexible as we now see him, had the muscles been continued down of the bulk we see them at their origin in the arm before, or in the buttock behind?

When the muscles are single, that is, where there is only one muscle of that kind in the body, I have marked it with a star in front; therefore, whenever this does not appear, the muscle described is to be considered as one having a fellow, or one muscle of a pair. It will be also observed, that, where Bourgelat's appellation is grossly erroneous, or uncharacteristic, I have added what would be a more appropriate distinction consistent with the human myology: and as it will be evident I have been studious to get much matter into the least possible room, so, instead of the words Origin, Insertion, Use, of the muscles, I have used the initials only, as *O, I, U,* placed to characterize the Origin, Insertion, and Use.

MUSCLES OF THE EXTERNAL EAR*.

First.—Origin. From the spine of the occipital, parietal, and frontal bones. —*Insertion.* Into the side of the ear. —*Use.* To draw the ears together.

Second.—O. At the spine of the occipital bone.—*I.* The base of the ear.—*U.* Assists the first.

Third.—O. At the posterior part of the same bone.—*I.* The posterior part of the base of the ear.—*U.* Draws the ear backwards.

Fourth.—O. Below the preceding.—*I.* The most inferior part of the ear.—*U.* Draws the ear outwards and downwards.

Fifth —O. By a thin expansion from the parotid gland.—*I.* At the anterior part of the base of the ear.—*U.* Draws the ear forward and outward.

Sixth.—O. At the internal part of the cartilage situated in front of the ear. —*I.* At the posterior and inferior part of its base.—*U.* Draws the ear backwards, and assists the second.

THE MUSCLES OF THE INTERNAL EAR ARE FOUR; THREE TO THE MALLEUS AND ONE TO THE STIRRUP.

First †.—*O.* At the superior part of the bony meatus.—*I.* Into the handle of the malleus.—*U.* To draw the malleus forward, and to relax the tympanum.

Second ‡.—*O.* External part of the eustachian cavity.—*I.* Long process of the malleus.—*U.* To tighten the membrana tympani.

Third.—O. Internal part of the eustachian cavity.—*I.* Base of the long process of the malleus.—*U.* Assists the former.

Stapedius.—O. The petrous canal near the bottom of the cavity of the tympanum. —*I.* To the stapes.—*U.* To elevate the base of the stapes, and shut the oval opening.

MUSCLES OF THE EYELIDS.

Orbicularis palpebrarum §.—*O.* Around the internal surface of the skin of the eyelids.—*I.* By a tendon to the angular process.—*U.* To shut the eye.

Levator palpebra superioris.—O. Around the bottom of the orbit.—*I.* Into the superior part of the tarsus.—*U.* To open the eye.

MUSCLES OF THE EYE.

Levator oculi ‖. *Depressor occuli. Adductor oculi. Abductor oculi.*—*O.* From the bottom of the orbit.—*I.* The anterior part of the sclerotic coat, opposite to each other.—*U.* To draw the eye upwards, downwards, inwards, and outwards.

Obliquus major, seu trochlearis ¶.—*O.* From the bottom of the orbit, passes through a pulley-like process.—*I.* Superior and anterior part of the globe.—*U.* To turn the eye on its axis, and carry it forwards and downwards.

*Obliquus minor***.—*O.* Near the ductus nasalis.—*I.* The back part of the

* These muscles, it is evident, are very improperly named by Bourgelat, as thereby their uses are not characterised. The student will readily detect their uses, and name them accordingly. This division of Monsieur B.'s may be also questioned, and the number is certainly incorrect, there being several minor muscles omitted.

† Laxator tympani.

‡ Tensor tympani.

§ This muscle is very difficult to demonstrate without great care; it is commonly raised with the skin.

‖ These muscles will be more fully explained when we treat of the eye.

¶ Obliquus superior.

** Obliquus inferior.

eye.—*U.* Directs the eye forwards and upwards.

Orbicularis, or *retractor.*—*O.* From around the optic foramen, surrounds the optic nerve.—*I.* The posterior part of the cornea transparens.—*U.* To draw the eye into the orbit.

MUSCLES OF THE LIPS.

* *Orbicularis.*—*O.* Around the mouth, and thus forms a species of sphincter.—*U.* To shut the mouth and contract the lips, and likewise the nostrils.

External molar.*—*O.* Anterior part of coronoid process.—*I.* Internal membrane of the mouth.—*U.* Various actions of the lips and mouth.

Internal molar†.—*O.* From the superior maxillary bone and posterior maxilla.—*I.* The commissure of the lips.—*U.* Operates jointly with the others, to elevate the angles of the mouth.

Cutaneous.—*O.* From the external surface of the masseter muscle by an aponeurosis.—*I.* By two portions to the commissure of the lips.—*U.* Assists in elevating the mouth.

Levator ‡.—*O.* Below the orbit near the junction of the angular, maxillary, and malar bones.—*I.* By an aponeurosis uniting with its fellow into the anterior part of the upper lip.—*U.* To raise the lip.

Maxillary §.—*O.* From the maxilla superior and angular bone, below the preceding.—*I.* By two portions to the angle and anterior part of the upper lip.—*U.* Assists the former.

Middle anterior ‖.—*O.* From the alveolary edge at the upper incisive teeth.—*I.* In the upper lip.—*U.* To depress the lip.

Levator inferiori ¶.—*O.* At the external part of the posterior jaw near the molar teeth.—*I.* In the skin of the chin.—*U.* To elevate the under lip.

*Middle posterior **.*—*O.* The alveolary edge of the under incisive teeth.—*I.* In the lower lip.—*U.* To depress the lip.

MUSCLES OF THE NOSE.

Transversal.—*O.* From the nasal spine.—*I.* To all the cartilage forming the nose.

Pyramidal.—*O.* By a thin expansion, from the middle and external part of the superior maxillary bone.—*I.* To all the external circumference of the nostrils.

Brevis.—*O.* From the lateral external part of the nose.—*I.* Into the skin of the false nasal fossa.

Cutaneous.—*O.* By the groove at the anterior edge of the maxillary bone.—*I.* Into the skin and false nasal fossa.—*U.* All these muscles operate in opening the nose.

MUSCLES OF THE POSTERIOR JAW.

Masseter.—*O.* From the maxillary and zygomatic spine.—*I.* At the external edge of the tuberosity of the posterior jaw.—*U.* To shut the mouth.

Crotaphite ††.—*O.* From the frontal, parietal, and occipital bones; filling up the cavity called the eye-pits.—*I.* By a strong tendon to the coronoid process of the posterior jaw.—*U.* It assists the masseter.

Spheno maxillary.—*O.* From processes in the sphenoid and palatine bones.—*I.* To all the internal surface of the posterior jaw opposed to the masseter.—*U.* It acts with the former in contracting the jaws.

Stilo maxillary.—*O.* By strong attachment to the stiloid process of the occipital.—*I.* To the tuberosity of the jaw.—*U.* Draws the jaw backwards, and opens the mouth.

Digastric.—*O.* From the extremity of the above process.—*I.* To the inner surface of the jaw near its symphysis.—*U.* Acts in concert with the other.

MUSCLES PROPER TO THE HEAD PERFORMING ITS MOTIONS.

Sterno maxillary.—*O.* From the point of the sternum.—*I.* To the tuberosity of the posterior maxilla.—*U.* Brings the head downwards, and assists in opening the mouth.

Long flexor ‡‡.—*O.* By little tendons from the transverse processes of the 3d, 4th, and 5th cervical vetebræ.—*I.* To the cuneiform process of the occipital.

Little flexor.—*O.* From the lateral part of the body of the first cervical vete-

* Buccinator.
† Levator anguli oris.
‡ Levator anguli oris
§ Pyramidalis, or second portion of levator labii superioris.—*Winslow.*
‖ Depressor labii superioris
¶ Levator labii inferioris.
** Depressor labii inferioris.
†† Temporalis. This muscle is covered by an aponeurosis arising from the bone above its origin, which serves to strengthen it.
‡‡ Longus colli.

bra.—*I.* To the styloid process of the occipital.

Short flexor.—*O.* From the first cervical vetebra.—*I.* To behind the cuneiform process of the occipital.—*U.* These three muscles flex or bend the head.

Splenius.—*O.* From the spinous processes of the 2d, 3d, 4th, and 5th dorsal vertebræ; from the cervical ligament, and by another portion from the first five cervical vertebræ.—*I.* By an aponeurosis to the mastoid process.—*U.* To bring the head backwards.

Complexus major.—*O.* From the spinous processes of the 2d, 3d, and 4th dorsal vertebræ, to the first six transverse processes of the same, and the last five cervical vertebræ.—*I.* Into the transverse protuberance of the occipital bone.—*U.* To draw the head backward, and to one side.

*Complexus minor**.—*O.* From the transverse processes of the 3d, 4th, and 5th cervical vertebræ, and by another part from the 6th, and 1st, of the back.—*I.* Into the mastoid process of the occipital.—*U.* To assist the former.

Rectus capitis major.—*O.* From the superior part of the spinous process of the second cervical vertebra.—*I.* To the posterior part of the occipital bone.—*U.* To move the head backward.

Rectus capitis minor.—*O.* From the 1st cervical vertebra, and the edge of the articular cavity.—*I.* To below the condyles of the occipital.—*U.* It assists the former.

Obliquus major †.—*O.* From the spine of the 2d cervical vertebra.—*I.* To the transverse eminence of the first.—*U.* To draw the head backward, and rotate it.

Obliquus minor ‡.—*O.* From the transverse process of the 1st cervical vertebra.—*I.* To the lateral transverse eminence of the occipital.—*U.* To assist the former.

MUSCLES OF THE OS HYOIDES.

Mylo hyoideus.—*O.* From the internal part of the posterior jaw.—*I.* To the appendix of the os hyoides.

Genio hyoideus.—*O.* From the inferior part of the concavity of the jaw.—*I.* In the same manner with the preceding.—*U.* These two muscles bring this bone forwards, and depress it.

Sterno hyoideus.—*O.* From the point of the sternum.—*I.* To the anterior part of the body.

Hyoideus §.—*O* From the internal surface of the little pectoral.—*I.* With the preceding.—*U* These two muscles carry the os hyoides backwards.

Stylo hyoideus—*O.* From the point or superior extremity of the long branches of this bone.—*I* To the lateral part of its body, permitting the tendon of the digastric to pass through it.—*U.* Draws the body of the bone upwards and sideways.

Cerato-hyoideus.—*O* From the little branches of the bone—*I.* To the inferior part of its large branches.

* *Arytænoideus transversus.*—*O.* From each side of the little branches of the bone, so that the fixed point is in the middle of the muscle.—*I.* To the inferior part of its large branches.—*U.* To draw the branches together.

MUSCLES OF THE TONGUE.

Genio glossus.—*O.* From the inferior part of the concavity of the jaw.—*I.* To the base of the tongue—*U.* To draw the tongue out of the mouth.

Basio glossus.—*O.* From the body of the os hyoides—*I.* To the base of the tongue.—*U.* To draw the tongue inwards and backwards.

Hyoglossus.—*O.* From the external and inferior part of the grand branches.—*I.* To the base of the tongue.—*U.* To draw the tongue sideways and backwards.

Sterno thyroideus—*O.* From the point of the sternum, dividing into two portions.—*I.* The anterior and lateral part of the thyroid cartilage.—*U.* Draws the larynx downwards.

Hyo-thyroideus.—*O.* From the lateral part of the body of the os hyoides.—*I.* To the edge of the thyroid cartilage.—*U.* Raises the larynx

Crico-thyroideus.—*O.* From the lateral external part of the cricoid cartilage.—*I* To the inferior edge of the thyroid cartilage.—*U.* To draw the thyroid and the cricoid cartilages together.

Crico-arytænoideus posticus.—*O.* From the posterior surface of the cricoid cartilage.—*I.* To the inferior part of the arytenoid cartilage.—*U.* To dilate the glottis.

Arytenoideus.—*O.* From the posterior

* Trachleo mastoidæus, or mastoidæus lateralis. It is divided into two parts; Bourgelat describes the lower with the complexus major.

† Obliquus capitis inferior.

‡ Obliquus capitis superior.

§ This muscle should be coraco hyoidæus: it partly arises from the humerus, and has two insertions; one into the sphenoid bone, as well as one into the os hyoides.

part of the larynx, and from one arytenoid cartilage to the other.

Crico arytenoideus —*O.* From the superior edge of the cricoid cartilage.—*I.* To the lateral external part of the arytenoid.

Thyreo arytænoideus.—*O.* From the internal and middle part of the thyroid cartilage.—*I.* To the lateral part of the arytenoid.—*U.* These three muscles shut the glottis.

Hyo epiglottideus.—*O.* From the base of the appendix of the os hyoides.—*I.* To the convexity of the epiglottis.—*U.* It elevates the epiglottis, and dilates the glottis.

MUSCLES OF THE PHARYNX.

Pterigo palato pharyngeus.— *O.* From the palatine and pteregoid processes of the sphenoid bone.—*I.* To the superior part of the pharynx.

Cerato pharyngeus.—*O.* From the internal part of the great branches of the hyoides.—*I.* To the pharynx below the preceding.—*U.* These muscles dilate the pharynx, drawing it from before backwards.

Hyo pharyngeus.—*O.* From the lateral part of the body of the hyoides —*I.* To the posterior part of the pharynx.

Thyreo pharyngeus.—*O.* From the thyroid cartilage.—*I.* To the posterior part of the pharynx.

Crico pharyngeus —*O.* From the crycoid cartilage.—*I.* As above.—*U.* These three muscles straighten the pharynx by drawing the parts together.

Arytæno pharyngeus—*O.* From the inferior part of the arytenoid cartilage.—*I.* In the pharynx.—*U.* It supports the pharynx.

* *Œsophageus.*—*O.* Arises and terminates in fleshy fibres on each side of the pharynx.—*U.* To shut the pharynx, and thereby facilitate the descent of the masticated bolus.

MUSCLES OF THE VELUM PALATI AND EUSTACHIAN CAVITY.

*Perestaphelini externus**.—*O.* From the styloid process of the temporal bone, and eustachian cavity.—*I.* To the inferior part of the velum palati.

Perestaphelini internus.—*O.* Arises with the preceding.—*I.* With the above.—*U.* These muscles elevate the velum palati.

Velo palatine.—*O.* By a thin tendon to the palatine bones or their juncture.—*I.* Into the inferior and middle part of the velum palati.—*U.* This muscle assists the others.

Scalenus †.—*O.* By two portions; one the first and larger from the external surface of the 1st rib, the other from the 4th, 5th, 6th, and 7th transverse processes of the cervical vertebræ.—*I.* To the lateral anterior part of the bodies of the 7th, 6th, 5th, and 4th cervical vertebræ.—*U.* When the rib is the fixed point, it bends the neck; when the neck is fixed, it assists respiration.

Flexor longus.—*O.* By numerous muscular fibres from the sixth dorsal to the first cervical vertebra.—*I.* By a tendon common to the two muscles, to the middle and anterior eminence of the first vertebra of the neck.—*U.* This muscle bends the neck.

Transversalis longus.—*O.* From the transverse processes of the first dorsal, and the five last cervical vertebræ.—*I.* By a tendon which unites with that of the splenius and common muscle.—*U.* It bends both head and neck.

Transversalis brevis.—*O.* From the transverse processes of the five first vertebræ of the back by so many small tendons.—*I.* To the transverse processes of the last cervical vertebra.—*U.* To extend the neck.

Spinatus longus.—*O.* The superior part of the spinous processes of the first 13 dorsal vertebræ.—*I.* To the spinous processes of the three last cervical vertebræ.

Spinatus brevis.—*O.* Inferiorly by tendons from the spinous and oblique processes of the first dorsal, and the five last cervical vertebræ.—*I.* By a strong tendon to those processes of the second cervical vertebræ.—*U.* This and the above extend the neck.

Cutaneous. ‡—*O.* From the cervical ligament covering all the muscles of

* Circumflex, seu Tensor palati.

† The second portion of this in the human is the scaleus medius.

‡ This considerable expansion is to be regarded as a muscle of the skin of the neck; as the cutaneous described among the muscles of the nose, is to the skin of the face. (See *Panniculus carnosus.*) This is the first muscle that appears on raising the skin of the neck, and is attached by aponeurosis to the spine of the scapula; and very intimately to the common muscle. These two muscles have been described, I believe as one, under the name of levator humeri; and from the origin and insertion it does appear, that this is a more proper description of it; at the same time that it must be allowed the upper portion can corrugate the skin, and that there is a line of division between it and the part that Bourgelat calls the common; I shall therefore, at present, continue this division.

the neck, of the head, and part of the scapula, united with the common muscle.—*I.* By uniting with its fellow in the front of the neck, opposed to the trachea, and to the point of the sternum.—*U.* A species of panniculus carnosus to the neck.

Inter transversales.—*O.* From the interval between all the transverse processes of the cervical vertebræ, except the first.—*U.* Assists in the bending of the neck.

Musculus communis *.—*O.* From the inferior and anterior part of the arm, passing to the point of the shoulder, when the body extending up the neck divides into two portions.—*I.* By one portion having several tendons, into the second, third, fourth, and fifth transverse processes of the cervical vertebræ. By another into the tuberosity at the petrous part of the temporal bone.—*U.* To move the head, neck, or arm, according to its fixed point. (See *Muscles of the Arm*)

MUSCLES OF THE BACK AND LOINS.

Longissimus dorsi.—*O.* From the outer crista of the ilium, the transverse and spinous processes of all the lumbar vertebræ, and from the spinous processes of the five last dorsal.—*I.* By fleshy portions into the upper part of the ribs, and by tendons into the transverse processes of all the dorsal, and the two last cervical vertebræ.—*U.* To stretch the vertebræ, and to draw the trunk upwards; therefore it must be of great use in rearing, galloping, leaping, &c.

Inter transversales.—*O.* These are small muscles whose number is equal to the dorsal and lumbar vertebræ, situated obliquely on each, from behind forward; extending from the transverse process of one, and from the spinous of the other from the sacrum.—*U.* To draw the spinous and transverse processes together, assisting in the flexion of the back.

Interspinales.—*O.* These occupy the interval which the spinous processes leave between them.—*U.* To assist in the motions of the spine.

Psoas lumbaris †.—*O.* From the lateral part of the bodies of the three last dorsal vertebræ, and the four first lumbar.—*I.* To the inferior and internal part of the ilium near the cotoloid cavity.—*U.* It is an antagonist to the long dorsal, serving when the animal rises to bring the body down again; when, on the contrary, he rises behind, the point that was before fixed now becomes the moveable point, and the hinder parts are brought forward by it. It acts in concert with the muscles of the lower belly, and assists in various motions.

MUSCLES OF RESPIRATION.

The muscles used in respiration are common and proper. The first are those whose use is common to this function, and to the motions of other parts; the proper are those only used in the elevation and depression of the ribs, or the enlargement of the cavity of the chest. (*See Respiration*) The proper are,

Levatores costarum ‡.—*O.* These are five to each side; arising, the first from the transverse process of the second dorsal vertebra; the second from that of the third, and so on.—*I.* The first to the anterior and superior part of the third rib; the second to the fourth, and so on with the rest.—*U.* To elevate the ribs.

Intercostals, external and internal.—*O.* They fill up the intervals between the ribs, and cross each other, the two plans being separated by a cellular tissue; the external arising from the posterior acute edge of each anterior rib, the whole length, pointing obliquely from downward upward; and the internal in the same manner, but under these, and point contrarily from above downwards.—*I.* Both external and internal into the sinuosity of each posterior rib.—*U.* To elevate the ribs, acting on the first, which, being immoveable, is thus the fixed point.

Transversalis—*O.* From the external surface of the first rib passing over the second and third.—*I.* To the external surface of the fourth.—*U.* It assists in elevating the chest.

Sterno costalis.—*O.* From the internal surface of the sternum.—*I.* By a tendinous production to the cartilages of the true ribs.—*U.* It is similar to the former.

* The common muscle is so called as being common to the head, neck, and arm; this and the cutaneous have been considered by some English veterinarians as one, the levator humeri. This portion can act upon either, as its fixed point is altered. Bourgelat describes it as giving off a part at the point of the shoulder to the sternum; but this part is evidently a distinct muscle, the sterno brachialis: nor is it inserted so low, or attached so low in the arm as he describes, though its aponeurosis extends downwards in union with the aponeuroses of these parts.

† Psoas parvus.

‡ In the human, these are only considered as portions of the intercostals.

THE MUSCLES COMMON TO INSPIRATION ARE,

Serratus longus.—*O.* By two portions, the anterior by an aponeurosis from the spinous processes of the twelve first dorsal vertebræ, the posterior by a similar aponeurosis to the spinous processes of the lumbar and of the six last dorsal vertebræ. —*I.* By fleshy digitations to the four last true, and the four first false ribs; and by similar digitations to the posterior edge of the seventh or eighth last false ribs, digitating with the posterior serrated portions of the great oblique; and by a very strong portion to the internal part of the scapula.—*U.* When the shoulder is fixed, it acts on the chest; and when that is fixed, it moves the scapula (*See Anterior Extremities.*)

Intercostalis communis. — *O.* From the transverse processes of the lumbar vertebræ.—*I.* By tendons to all the ribs at the superior part of their posterior edge —*U.* To elevate and depress the chest.

* *Diaphragm.*—This is a most important muscle, not only to the chest, but to the belly, and will be described at large, in treating of the chest. (*See Splanchnology.*)

MUSCLES OF THE ABDOMEN.

The parietes of the abdomen are formed by four pair of muscles.

Obliquus magnus seu Obliquus abdominis externus—Is the most external of these muscles, but it is not satisfactorily described by Bourgelat. It arises by fourteen or fifteen fleshy appendices from the fourteen or fifteen last ribs, some of which intermix in a serrated manner with the digitations of the serratus muscles. It is likewise strongly attached to the spine of the ilium from the last rib, and is covered laterally by the latissimus dorsi, and adheres anteriorly to the pectoralis and intercostal muscles. From these origins and attachments it is continued down tendinous, confounding itself with the tendinous parts of the lesser oblique and transverse; and, meeting its fellow, is united with it from the sternum to the symphysis pubis; forming a white line, thence called *linea alba*. Its junction by this means is so intimate, that it might be regarded as a biceps muscle, with as much propriety as a distinct pair. About the middle of the linea alba in the fœtal colt, it is perforated by the umbilicus or navel-string. The tendinous portion attached to the spine of the ilium is not continued in its attachment from thence to the symphysis, but forms a strong band which is unattached for some space, and is then inserted into the pubis; under the name of *Fallopius's* or *Poupart's ligament.* This unattached portion consequently leaves an opening, under which pass the crural vessels going to the extremities. Hence any of the contents of the abdomen protruding with these, is called crural hernia. This expansion of the external oblique forms a species of tendinous doubling, but not a complete abdominal ring, as in the human. Through this the spermatic cord of the male, and the round ligaments of the womb, in mares, pass obliquely between the internal and external oblique, for an inch and half before either cord or ligament turns into the pelvis. It will therefore be evident, that when strangulated hernia takes place in the horse, it can only happen in the mouth of the sac before Poupart's ligament, under the obliquus externus tendon; but in consequence of the horizontal situation of the animal, hernia at the abdominal ring is very rare. The contents of the abdomen may likewise now and then be protruded under Poupart's ligament, and under the expansion that the external oblique gives off, or connects itself to. This species is called inguinal hernia, and of which the celebrated horse Mentor died; though the instance was a very rare one.

Obliquus parvus, seu Obliquus abdominis internus.—The fibres of this muscle have a contrary direction to the preceding, being situated obliquely from above downwards, and from behind forwards. It arises from the inside of the false ribs by tendinous origins, and superiorly by a similar aponeurotic expansion with the external; posteriorly it originates from the anterior angle of the ilium; it is then continued, but not exactly in the same manner as in the human, and is inserted tendinous into the linea alba, the whole length of that line, and into the inside of the pubis. Its tendon permits the passage of the spermatic cord over its edge; and as it passes, it gives off some muscular fibres to form the cremaster muscle, frequently in conjunction with the transversalis.

The *uses* of these two muscles, it must be evident, are various and important; they tend to support the abdominal contents, and very forcibly act in the expulsion of the fæces, and in the delivery of the foal from the womb; they are likewise very considerable auxiliaries in respiration, expelling the air from the lungs, by lessening the cavity of the belly, and thus forcing up the diaphragm. They are probably assistants in progression also. When one of each of these muscles acts without its fellow, the body must be strongly drawn to one side: also when the body is elevated, particularly in galloping, they bring the pelvis and hind legs under the centre of gravity of the body; that is, they double those parts under the animal, acting with the psoas muscles. In their relaxation the muscles of the back become antagonists to them.

Transversalis.—This muscle has a species of division, that, properly, forms it into two to each side, which originate by an aponeurosis from the transverse processes of the lumbar vertebræ; posteriorly from the spine of the ilium, expanding on the posterior and lateral part of the belly, extending up to the internal edge of the false ribs, and to the xiphoid cartilage, where it begins its insertion into the linea alba, and continues it posteriorly. It assists forcibly in the compression of the abdomen.

Rectus abdominis.—Arises from the pubis, one on each side of the linea alba, and is exposed on removing the external oblique; it grows rather broader and thinner, as it advances; but again narrows to insert itself into the cartilages of the last five or six true ribs by fleshy and tendinous portions. These muscles appear only as fleshy bands in front of the abdomen, of about half a foot in breadth, intersected by tendinous lines in a similar manner with the human rectus; except that in the horse there are six, seven, or eight of these transverse tendinous interlineations, instead of three which exist in ourselves. The use of these intersections of tendinous fibre is to strengthen the muscle, which otherwise, from its great length, would be weak; and hence the superior number of these lines in the horse is accounted for, the additional length requiring this additional support. This pair of muscles, it is evident, must operate in supporting and pressing the abdominal contents.

MUSCLES OF THE ORGANS OF GENERATION.

Dartos—This, I think, should be considered as a common muscle to the scrotum, lining its internal surface: it is usually considered as a mere cellular membrane; but when its great power of contraction is considered, it is more than probable that it has a muscular structure.

Cremaster.—*O.* From the posterior edge of the obliquus internus, the aponeurosis of the fascia lata, and the transversalis.—*I.* By a fleshy expansion around the cord, and over part of the vaginal coat of the testicle.—*U.* To draw the testicles upwards during violent exertions, that they may not be injured, for which it is particularly fitted, being a part of those muscles already at such times in strong action.

Erectores.—*O.* From the posterior, superior, and internal part of the tuberosity of the ischium, descending obliquely from behind forward, embracing the two cavernous bodies of the penis.—*I.* To the lateral parts of those bodies.—*U.* To draw, constrict, and raise the penis.

Acceleratores.—*O.* From the ligament at the posterior part of the pubis, and the membranous part of the urethra in an oblique direction.—*I.* By a tendinous line into the urethra nearly its whole length.—*U.* To accelerate and press forward the urine and semen.

Triangularis, seu transversalis. — *O.* From the tuberosity of the ischium. —*I.* Into the accelerators and the urethra.—*U.* To assist the former.

MUSCLES OF THE CLITORIS.

First pair, seu sphincter vaginæ.—*O.* From the lateral parts of the sphincter ani.—*I.* Into the lateral parts of the body of the clitoris.—*U.* Contracts the vaginæ, and compresses the clitoris.

Second pair, seu erectores clitoridis.—*O.* The inner part of the crus of the ischium.—*I.* To the root of the clitoris. —*U.* It raises the clitoris.

MUSCLES OF THE ANUS.

The muscles of the anus, I have found, in the subjects I have dissected, to be two pairs, and a single one; retractores, levatores, and a sphincter. Bourgelat describes the levatores as a small pair, which they are: but totally overlooks the retractores, which are very considerable. La Fosse notices these, but makes no mention of the others. The levator pair are similar to the transversus perenei of the human; but seem more immediately appropriated to the anus, hence I have so termed them.

Retractor ani.—*O.* From the ischium superiorly, where it forms the acetabulum; and in part from the sacro ischiatic ligament, passing rather upward and backward.—*I.* Into and around the rectum, leaving a line between its insertion and that of the sphincter.—*U.* To retract and draw in the anus.

Levator ani.—*O.* From the lateral muscles of the tail, and from above, having an aponeurosis, giving it firmness.—*I.* Into the bottom of the anus at the outer part, crossing its fibres.—*U.* To elevate the anus.

* *Sphincter ani.*—*O.* By a strong fleshy band from around the end of the rectum, having a line of separation between it and the retractors.—*I.* Runs into and around the anus, forming an orbicular muscle.—*U.* To close the anus, preventing the constant escape of the fæces, and the entrance of air, insects, &c.

MUSCLES OF THE TAIL.

These muscles are very intricate and difficult to dissect, so as to render them distinct from each other. It appears to me, that the divisions made both by La Fosse and Bourgelat are too numerous; and that there are fewer real muscles, with more numerous origins; but as Bourgelat is apparently the most correct, I shall continue to follow him.

Sacro coccygiens superior.—*O.* From the superior part of the sacrum, where its transverse processes appear.—*I* By short tendons into all the bones of the tail superiorly.—*U.* To elevate the tail.

Sacro coccygiens inferior externus.—*O.* From the lateral internal part of the sacrum.—*I.* By strong tendons rather inferiorly into each bone of the tail.

Sacro coccygiens inferior internus.—*O.* By an intermixture of heads in the same manner with the preceding.—*I.* By tendinous production to the first five bones of the tail.—*U.* These two muscles depress the tail.

Lateralis.—*O* By tendons from the spinous processes of the last two lumbar vertebræ and sacrum laterally.—*I.* By tendons into all the bones of the tail, laterally.

Obliquus.—*O.* By a flat tendon from the sacro-sciatic ligament, passing obliquely upwards.—*I.* To the inferior part of the sacrum and first five bones of the tail.—*U.* These two muscles perform the lateral motions of the tail.

The tendons and fleshy parts of the muscles of the tail all take rather a lateral direction, so as to form it into a kind of square. The elevators run on each upper angle, and the depressors and oblique on each lower angle. The depressing muscles are much the strongest, which has given rise to the practice of nicking, or dividing those muscles whose contraction depresses the tail. The lateral muscles are, I conceive, the strongest depressors of the tail, when both are in action: when one acts alone, the tail is carried to one side; and as these are placed very near the centre of motion, and the tail is a long body to wield, especially when armed with long hair; so it was necessary they should be strong to enable the animal to brush himself, and prevent the attack of insects. Besides these muscles, those forming the upper angles likewise act laterally when only one side contracts at a time: were this not the case, a nicked horse could not afterwards carry his tail to either side; for the lateral muscles of the lower angles are usually divided in the sections made in this operation, and it is necessary they should, being, as I before mentioned, when in conjoint action, strong depressors. It is from a want of anatomical knowledge of the tail, that it is so often set awry; for if the sections, particularly those more remote from the tail, are not made of an equal depth and extent laterally, some part of the contracting fibres will remain, and the horse carry a false tail.

The muscles of the extremities are described in Section XVII, which is dedicated to a minute examination of all the parts forming the fore and hinder limbs.

Section XI.

BURSALOGY.

THIS subject comprises a knowledge of those appendages to tendons, whereby the effects of friction are prevented. Tendons are usually furnished with a sheath or theca, within which is secreted a glairy, slippery mucus, of the nature of the synovia; by which they are enabled to slide within these sheaths with great ease. At the extremities of the tendons, and in fact between tendons and other parts, and between tendons themselves, wherever they are liable to pressure or friction, they are frequent, and form distinct membranous sacs not unlike the capsular ligaments, and are called *mucous capsules* or *bursæ mucosæ*. These appendages to tendons appear formed of a dense cellular membrane, whose internal surface is very vascular, and whose vessels secrete this mucus. From external injury, or other causes, this surface becomes at times inflamed; and when its resolution is not effected speedily, coagulable lymph is thrown out, which being not always again absorbed, remains between the tendons and its sheath, and occasions distention and lameness, from the prevention that arises to the freedom of motion; therefore, we are at no loss to account for those hardened enlargements that are frequently seen in hard worked horses in the neighbourhood of the flexor tendons or back sinews, nor for the stiffness they occasion. The mucous capsules at the extremities of the tendons also are extremely liable to become diseased; and bursal disease receives very different names according to its situation, as *windgalls* at the fetlock; *bog spavin* or *thoroughpin* in the body of the hock; and *capulet* at the hock point. Occasionally they are seen in the knee also. They appear to be brought on by undue exertion of the parts they are intended to lubricate; and which exertion appears to act as a stimulus to them to increase the mucous secretion within. (See *Windgalls*, &c.) For a detailed account of the *bursæ mucosæ*, I would refer the student to Monro's description of them, with plates; and to Fourcroy's *Mémoire des Tendons*; for, as it has been seen that the muscles of the human and horse have a considerable similitude, so it may be readily imagined those of the tendons and mucous capsules have likewise.

Section XII.

ANGIOLOGY.

THE *vessels* of the body are divided into *arteries*, *veins*, and *absorbents*; and, except the hoofs and epidermis, there is perhaps no part of the body without them.

Of the Arteries generally.

The *arteries* are canals originating from the ventricles of the heart by two trunks, the aorta and pulmonary, whose subdivisions are destined to supply the whole body with blood. Considered generally, arteries are long membranous tubes, which by reason of their numerous bifurcations become smaller as they proceed to the extreme parts*. In their course an especial

* Although the individual vessels themselves diminish, yet the conjoined area of the numerous subdivisions springing from them is greater than the parent trunks; which increase appears to arise from the greater capacity of the subdivisions, and the proportional increase to their coats.

regard is observed towards their safety; hence they are deep seated, and pass on the inner sides of the limbs rather than the outer. They appear equally guarded against accidental pressure from neighbouring parts, by passing over the bending surface of a joint; and where the extension of soft parts and their frequent motions would render the blood within continually liable to obstruction, they proceed in a tortuous course*. An artery is composed of three different substances, united by means of cellular membrane into one elastic tube. These are its tunics, the external of which is called its elastic coat, as the inner is its cuticular or membranous; between which is situated the muscular. The external, appears a thick, dense, cellular membrane of peculiar whiteness, whose elastic powers are so considerable, as to preserve the cylindrical form of the principal canals when empty. By their elastic power, the arteries are capable of being distended so as to admit of a larger quantity of fluid than is merely sufficient to render them cylindrical: by this likewise they can adapt themselves to a smaller quantity than is usual; were it not for this power, a small hæmorrhage must prove fatal. It is by this elasticity, which is acted longitudinally as well as circularly, that the divided ends of a wounded artery retreat within the cellular substance around, and thus close their divided orifices. When this is prevented by a partial division only, the hæmorrhage continues†. The elastic powers appear in different proportions in different horses, as in different men; from which arises some phenomena in the different constitutions of individuals of each species, giving some a greater disposition to inflammation; which is called a sanguineous temperament. The muscular coat of the arteries is interposed between the two others, and appears formed of fibres nearly circular, extending around the artery by several segments joined together, which are stronger in the small than in the large branches, and strongest of all in the capillaries. The muscular tunic appears to exist in greater proportion in the horse than in the human; and this accounts for the stronger disposition in the horse to inflammation; and that in him gangrene is so soon produced, that the process of ulceration is peculiarly quick, and that granulations so speedily form. To this cause it is probably owing, also, that acute inflammations in the horse run through their stages so much quicker than similar affections in the human. Inflammation of the lungs frequently terminates in mortification in forty-eight, and sometimes thirty-six hours. From this

* The tortuous direction of the arteries serves also some other purpose than that of preserving them from accidental obstruction by pressure: this we learn from finding them so in the brain, testicle and uterus, where they can be little liable to it. Here retarding the flow of the blood is probably studied.

† Aware of this circumstance, a prudent surgeon immediately divides the vessel entirely; and if it be not a large one, this division alone is sufficient to stop the flow of blood.

power also it is, that a horse can bear the division of a much larger artery without danger than a man. Even dividing of the carotids takes a very considerable time to produce death, while in the human it follows almost instantaneously. From the strength of this muscular coat in the capillary arteries, when they are stimulated, as in the cold fit of fever, the blood is forced back into the larger vessels, or pressed forwards into the veins. It is this that produces shivering and a sensation of coldness in these cases*.

Our knowledge of the termination of these vessels is very confined; we can readily see their ordinary termination by anastomosis, or the uniting of one branch into another, whereby the blood has its course in some measure altered, and the constitution receives safety under the division of the vessels of a part, from its being thus furnished by some other. Our practice of surgery is greatly extended by this knowledge, and we no longer fear taking up a large artery: likewise, by free communication, pressure is less injurious than it would otherwise be. We also know, that arteries terminate by means of their capillary branches in veins, because we can empty the arteries, by drawing the blood from the venal trunks; and because injection forced into the arteries, in many instances, enters the veins. They likewise terminate by excretory ducts on secreting surfaces, or within bodies called glands; by which the contents of the arteries become changed, and part of the blood having remained to enter into new combinations, the remainder is returned by venal branches. Arteries have also another common termination, by exhalent openings on extended surfaces. It is by this means the insensible perspiration passes off; and by the same means serous fluids are emitted throughout most membranous surfaces and cavities. A more confined termination of arteries is that into cells, from which veins arise to take it up again, as in the spleen, &c. Differerent parts are more or less plentifully supplied with arteries according to their nature: secreting organs have usually large trunks, as the kidneys, spleen, liver, &c. They are likewise themselves furnished with arterial and venal branches, for the nourishment of their tubes. They have also nerves, but are nearly destitute of feeling. Their absor-

* A muscular coat has, however, been denied, from the uniform whiteness of the arteries; but we have had other occasions of pointing out that want of colour is no proof of the absence of muscular structure. Mr. Hunter first demonstrated this muscularity of the arteries Having bled a horse to death, he found that the area of these vessels was considerably diminished; the aorta had lost one-twentieth of its original breadth, while the radial artery was contracted to one-half. Other proofs are not wanting to establish the muscularity of these vessels: a principal one is the fact of their acting without acceleration, or alteration of the pulsations of the heart, as we know from slight topical inflammations, and from a blush on the cheek, all which excite heat and redness in the part, but do not disturb the general circulation.—Vide *Hunter's Lectures; Wilson on the Blood; and Dr. Thompson on Inflammation.*

bents, if any, are too minute to be detected, although Mr. Cruickshanks conceives he found them on the human aorta.

The living power of the arteries must be great, for they are capable of extending themselves through coagulable lymph thrown out, whereby they organize it: this we see take place in the callus of bones, and in cicatrices, which in time become vascular; but an artery, when divided, will not become pervious, though a vein will. The evident use of the arteries is to convey the blood from the heart to the different parts of the body, furnishing them with nutrition, by keeping up their vital principle, and affording them heat. It is through their agency the blood is carried to form all the parts of the body, as well solid as fluid; they repair decay, and reorganize. An intimate knowledge of their functions, therefore, forms a very principal branch of physiology; as a well grounded acquaintance with their situation is likewise essentially necessary to the veterinary surgeon.

Mr. Hunter has taught, that there is a strong affinity or peculiar connection between the blood and its vessels; and his opinions on this subject have led to considerable alterations in our manner of treating diseases in general, and wounds in particular. The fluid state of the blood appears connected with living vessels; blood parted from them dies and coagulates. The blood likewise stimulates its vessels, which, perhaps, is one very principal cause of their contraction: this stimulus should be in a certain degree; if increased, disease is produced: it is not unlikely, likewise, that a defect in this stimulus may also produce derangement. As the use of the arteries is to convey the blood from the heart, so the heart itself appears to be the first but not the only agent. The arteries equally unite in the office; and as the force of the heart decreases by distance, that of the arteries strengthens the farther they are removed from it; so at last the column is pressed on by one regular force: thus in every minute artery divided, there is a regular stream, with scarcely any jet: this, however, only takes place in the minutest arteries. We thus see why there is no pulsation in the veins; they receive the blood from the arteries in one equable stream, and continue it by the last impulsive force of the heart, and the new one of the arteries. Pulsation is a certain sensation in the artery; which, from various experiments, is found to arise from its being alternately in a state of distention and relaxation. It appears, that when the left ventricle contracts, and forces the blood into the arteries, the pressure of the fluid occasions a distention of their coats, and a consequent dilatation, which is termed their *diastole:* when the left ventricle ceases to act, and becomes distended, then the impetus against the sides of the vessels ceases, when the muscular fibres of the artery contract and lessen its size; and this state is called its *relaxation* or *systole.*

Of the Pulse.

This momentary increase of capacity in the artery whereby its diameter is enlarged, is called its *pulse;* and the more frequent are these dilatations in it, or the less numerous, so is the pulse quicker or slower. The circulation being slower in all large animals than in small, the standard, i. e. the healthy pulse of the horse, is from 45 to 50; in the human from 68 to 75; and in the dog from 90 to 110. In young animals, the weakness of the system, and its irritability are considerable, hence they have a much quicker pulse: the colt's pulse is from 60 to 65; the human infant's beats more than 110: this gradually lessens to the adult period, when it follows nearly the standard we have noticed. As the heart of a large animal has a longer way to send its blood, and its resistance is consequently increased, so it takes a longer time to accomplish its contraction; and thus there is not only a difference between the different species of animals, but between individuals of the same species as they vary in size; from which, the smaller the horse, the quicker will be the pulse.

As very few active diseases can exist in the body without disturbing the circulation by either accelerating, retarding, or interfering with its regularity; so the pulse has been resorted to as furnishing a criterion of the nature and severity of the disease; not altogether invariable or arbitrary, but sufficiently so to deserve the most serious attention of the veterinarian, who will find it in cases of danger and obscurity frequently his only practical guide. To a due consideration of the state of the pulse, not only the immediate state of the disease itself, but many surrounding circumstances, must be taken into the account. A cold temperature will lessen the circulation; a particular irritability of the system in some horses quickens their pulse; and the action of fear materially influences it, for which reason great caution is necessary to avoid alarming the animal, or the pulsating vessel may present a wrong indication. The circulation being universal, and the motions of the blood being uniform, it follows not only that the pulse may be felt in every part of the body, but that the pulsations are synchronous. It is, therefore, of little importance where the pulse is felt, provided we have the opportunity of pressing the pulsating artery against some hard body, or of actually embracing it between the finger and thumb; which, however, is seldom to be done. Bartlet recommended the pulse to be felt by the leg, by the carotids, or by the heart itself. Mr. Clark describes it as most easily felt at the origin of the temporal artery at the base of the ear. Others point out the metacarpal arteries as the most convenient point. It is not a little remarkable that a branch of the internal maxillary artery, which branch passes over the anterior portion of the tuberosity of the posterior jaw, (*vide o, Plate III*) (see also *Angiology*) should have so long remained unnoticed; which I believe it had done entirely, until pointed out by myself. The situation of this vessel is in every respect so convenient, and its ready application to the hard body of the maxilla, as well as the height in which it is placed as regards the examiner, are all so favourable, as to give it a decided advantage with all candid practitioners. With those who embrace nothing but what emanates from themselves, or are ashamed to introduce the improvements of others, these instructions have nothing to do. Having detected the artery, press it moderately against the inner side of the jaw by means of the fore-fingers, when an accurate examination of the pulse may be readily made. Every veterinary practitioner ought to accustom himself to the natural state of the pulse, by frequently feeling pulses of different healthy horses; by which means the varieties produced by disease will be more easily detected: for an affected pulse does not only consist in its quickness and slowness, but also in its hardness and softness: the differences between either of which, and that of health, can only be learned by attention and habit. A *full strong pulse*, where the resistance to the pressure of the fingers is very considerable, giving a bounding stroke, and evidently betokening an increase of the diameter of the artery, seldom exists in the diseased horse. Some natural excitements may bring it on, as lust, exercise, &c. &c. and it is now and then met with in phrenitis, or staggers. The full pulse of the horse under the highest inflammatory affections has always some confined vibratory hardness, and never gives the full bounding feel, present in these cases in the human: thus though the pulse of the horse presents a much more unerring criterion of the state of disease than that of man, yet the analogy is by no means perfect between them. In treating therefore on diseases, whenever the term *full pulse* occurs, it must be considered as intended to convey the above idea only. A *hard pulse* with increased frequency is the most common in the inflammatory affections of the horse, in which case the arterial action is stronger, with diminished diameter of vessel. It is detected by the peculiarity of feeling like a cord vibrating under the finger, and not like the full undulations of an overcharged vessel. This vibratory hardness with increased frequency is the usual attendant on the active stages of visceral inflammations. In the more early stages of peritoneal inflammation of the intestines, or red colic, it is the great characteristic between that and the spasmodic colic or gripes: for in the latter, although after a few hours continuance there is often some hardness in the pulse, it is always accompanied, when purely spasmodic, with a degree of fulness also, unknown to the other. This pulse is common to all inflammations of parts less essential to life, as of the cellular membranes, muscles, skin, &c. &c., when sufficiently violent to affect the constitution. It accompanies the early stages of bad catarrhal affections, and occasionally of pneumonia also; but in the former it usually exhibits more frequency than in the latter. The *wiry pulse* is a very important modification of the hard, in which the sensation is contracted from that of a vibrating cord to that of a jarred wire, whence its name of wiry, thready, &c. It is commonly accompanied with increased frequency, but by no means invariably so; and is often present in the protracted stages of visceral inflammation, and in some few it accompanies them from their outset. It appears to be the common consequence of the former pulse, and thus succeeds to it so frequently in the secondary or protracted stages of all inflammatory affections of magnitude; particularly of such as commence slowly. The *oppressed pulse* is also a modification of the hard pulse, and appears the consequence of the opposing efforts of the muscular and elastic portions of the artery; the efforts of the one appearing to be employed to restrain the distention forced on the other, by a congestion within some part immediately concerned in circulation. It is from this cause that it is so common to the active stages of pneumonia, or inflammation of the lungs; and it is probable that, when it is present also in other visceral affections, it arises from the secondary effect produced on the respiratory organs. When the difficulty is in a certain degree removed to the transit of the blood through the right side of the heart, by abstracting a large quantity of it, and thus removing the congestion; it is remarkable how this oppressed pulse, creeping, labouring, and often slow, will rise into a more full, free state, but still with remnants of its parent hardness remaining; and as long as such alteration is produced by bleeding, it is prudent to pursue it.

A *small pulse* is usually present in all cases of great debility, and is generally attended with increased frequency. When it is very small and thread-like, it shews that the debility is extreme, and prognosticates a fatal termination of the existing disease, the heart and arteries attempting to make up by quickness what they want in strength. If with this degree of smallness it vary in its regularity, or intermit, it is even more certainly a fatal prognostic. We must be careful not to be misled by a small *oppressed* pulse frequently present in inflammation of the vital organs, particularly of the chest, to mistake this for a pulse of debility. The distention of an artery may be so great as to overcome its contracting power, as any elastic body may be distended beyond its tone or capability of recovery; hence a small pulse is not always a sign of general debility: for in inflammation of the vital organs, this distention of the vessels frequently takes place to such a degree as to prevent their natural contraction; and a small pulse is by this means produced: but if the over-distending column be removed by copious bleeding, the over-stretched muscular coat recovers its tone, and can contract on its contents; and thus, in such cases, the pulse is found to rise on bleeding. The bladder, we know, under long retention of the urine, becomes so distended as to be incapable of contracting on its contents, and, unless it be artificially emptied, the muscular coat will give way and burst. It is therefore probable, that an inflamed part is not in a state of increased strength, though it is of increased action, but on the contrary; for as the vessels are preternaturally distended, they are in consequence weakened: hence, in some local inflammations, or where the vessels of a part only are under this state of increased action, topical bleeding, by emptying those particular vessels, will often prove highly useful; while, on the contrary, general bleeding may, in the same case, be prejudicial, because, by weakening the system in general, it must still further weaken those particular vessels, and render them less able to contract. We may, therefore, learn that instances do occur where diminishing the general strength may augment the inflammation.

A *quick pulse* usually denotes irritability in the system; but there may be natural or common causes for such quickness of pulse; as youth, diminutive size, fatigue, a hearty meal, or a particular temperament; but when none of these natural causes are present, great quickness of the pulse proves a diseased irritability of the vascular system, and often a want of power also. But its indication becomes very different as it is accompanied by fulness or smallness. When the frequency of the pulse is considerable, with an increase of strength in the action of the artery, it may be gathered, from what has already been said, to betoken inflammatory action, general or local.

A *slow pulse* may be occasioned by pressure on the brain from the effect of accidents, or from congestion, as in lethargy, sleepy staggers, epilepsy, &c. It may also be brought on through the medium of the stomach by various substances taken in. White and black hellebore, aloes, digitalis, hemlock, and whatever excites nausea, decreases the frequency of the pulse in the horse as in the human. But unfortunately in the horse our means of exciting this sensation are usually limited to such matters as are in themselves sources of great irritation, and hence hurtful. Neither is a simple alteration in the frequency all that is necessary. To a beneficial end we should render the pulse soft also, without which a slow pulse may retain its inflammatory base, as we witness in the lethargy of staggers.

A *soft pulse* is in all its characters the reverse of the hard, the full, or the oppressed. It is frequent at the decline of inflammatory affections, and usually shews the cessation of the inflammatory diathesis; thus, after the hot fit of fever is removed, the pulse from being hard becomes soft. Suppuration, as a termination of inflammation, also produces it; and whenever there has been great local inflammation, and pus forms, the slow pulse is generally present.

A *regular pulse* is sometimes found under very diseased affections; but it is usually increased in its fulness or smallness, or in its hardness or softness: a regular pulse with a proportionate fulness is one of the strongest marks of health; as an irregular pulse almost always shews disease: but the irregularity may be occasioned by organic affection; that is by a peculiar formation of parts, or some disease about the heart, as ossifications of its valves, or of the larger vessels.

Irregularity in the pulse is a mark of great irritability, and when not arising from any organic affection, it is a mark of great debility also. Inflammation of the heart is usually accompanied by great irregularity in the pulse, with extreme oppression and smallness; the heart contracts several times, and then stops till more blood be sent to it. An *irregular pulse* in fever shews great danger: it usually accompanies mortification and gangrene; and when inflammation of the lungs terminates in this way, this pulse is usually present. A very peculiar irregularity of the pulse is also present when a serous fluid is thrown out into the chest after these inflammations; in which cases, besides its intermission, the pulse appears as though undulating through a bladder of water. This pulse should be particularly noticed, as, when once felt, it need never be forgotten.

The Distribution of Arteries.

The *aorta* is the principal vessel of the arterial system, and originates from the left ventricle of the heart, at its anterior and middle part, between the vena cava, pulmonary artery, and the trachea: it soon divides into two branches, one of which is carried forwards to furnish the head and extremities; the other proceeds backwards to be distributed to the rest of the body, but exhibits no incurvation, as in the human. These divisions form the anterior and posterior aortas; but previous to this division, the original trunk has given off a pair of small arteries, immediately at its origin, under the semilunar valves, called the coronaries.

The *anterior aorta* is continued single to between the second and third rib, where it divides into two unequal portions, called its right and left branches. The *left division* gives first a small branch to the pleura, next what may be called the dorsal; then two others, penetrating between the first, second, and third ribs, under the names of anterior and posterior cervicals: from this, passing towards the first rib, it gives off the left vertebral, and the internal pectoral; when bending its course over this rib, it takes the name of axillary. The *right division* of the anterior aorta is much larger, as well as longer than the left. Its first considerable branches are, one to the pleura, an anterior and posterior cervical, or what has been called a bronchial, and the internal pectoral. The *carotids* are the next divisions of this branch, and arise by one large trunk. The continuation of this right division of the aorta then gains the edge of the first rib on the right side, and forms the right axillary. The *arteriæ coronariæ* arise from the aorta immediately on its leaving the heart, one on the right, the other on the left side, and are distributed around the base of that organ like a garland, from whence they draw their name. The *pleural* is usually the first branch given off by the anterior aorta; but it sometimes arises from the dorsal, distributing its ramifications to the pleura. The *dorsal* form the next pair, the left arising from the left division of the anterior aorta usually, and the right from the right division; sometimes it arises from the right cervical. The dorsal pair gives ramifications to the pericardium, to the muscles under the scapula, to the neck; and it generally furnishes the first two or three intercostals. The *cervicals* are two pair on each side. The left pair usually arises from the left division of the anterior aorta; passing between the first, second, and third ribs, its ramifications are distributed to the cervical ligament, and to the muscles of the neck and withers. The right cervicals arise from the right division of the aorta, and give rami to the œsophagus, mediastinum, and surrounding parts.

The *vertebrals* are two important arteries, the right arising from the right division of the anterior aorta, after those we have described; and the left from its left division: they are given off opposite the first rib, and pass under the transverse process of the first dorsal vertebra, insinuating themselves between the sixth and seventh cervical, and are continued up through the foramina at the base of the transverse processes of the remaining six of these vertebræ: as they pass, they send off small branches through the lateral notches in the vertebra to the spinal marrow, and likewise to the muscles of the neck. From these divisions they become very small near the head; where they give a small ramus, which usually passes through a foramen in the oblique process of the atlas, to communicate with the external carotid, by which a communication is kept up between these vessels. After they have made a number of inflections apparently to retard the circulation, they unite, and form the basillary artery, which runs on the inner surface of the cuneiform process of the occipital bone, and is finally ramified in the cerebellum, first giving a branch which unites with a similar one of the carotid to form the circulus arteriosus. The *internal pectoral* is usually the next pair, which arises from the left division of the aorta; that of the right side sometimes arises from the right axillary, after it has given off the carotids. Having furnished the *external pectoral*, each is continued along the internal surface of the first rib, where it gives branches to the pleura, when, gaining the sternum, it passes along its internal surface, giving rami to the mediastinum, diaphragm, and parts around; and is finally ramified in the muscles of the chest, usually giving off a branch to anastomose with the epigastric.

The *axillary arteries.*—The left branch of the anterior aorta having furnished these principal, and other lesser branches, has its trunk curved about midway over the anterior part of the rib, and inclines in the axilla, passing out at right angles with the head of the humerus. In its passage to the glenoid cavity, where it takes the name of humeral, it generally gives off three branches, two of which furnishing the scapula, may be called *scapularis inferior,* and *scapularis superior:* the third is distributed about the articulation of the scapula with the humerus, and is thence called *arteria articularis.* The *humeral artery* descends along the internal surface of the humerus, giving a considerable ramus that penetrates the biceps extensor cubiti: when arrived at the inferior part of that bone near its articulation, it makes a fresh division, giving sometimes one, at others two considerable branches, one of which passes between the ulna and radius. The *ulnar* branch proceeds posteriorly between the two bones, and down the lateral external part of the fore arm, giving the medullary vessels to both ulna and radius, and rami to the muscles of this part, anastomosing at the knee with a branch of the radial, and continuing often in a small branch down the canon. The *radial* first gives off a branch that passes between the condyles of the radius, in company with a vein immediately under the extensor pedis anticus, and over the extensor metacarpi radialis, and is distributed to the anterior part of the knee. The main trunk is then continued down under the muscles, behind the radius; penetrates the ligaments, and passes within the arch of the pisiform bone; in which passage it sometimes gives a small branch, which runs down the ligament of the canon, ramifying with its parent trunk and with the ulnaris.—The *metacarpal.* Continued down and penetrating the sheath of the flexor tendon, the radial trunk takes this name, and in company with the metacarpal nerve is continued on the inner side of the flexor sheath; gaining the under portion, and descending in front of the bifurcating suspensory ligaments, in which course it furnishes the canon with its medullary branch, and with a ramus anastomoses with the preceding. At the lower part of the canon, in company with the metacarpal vein and nerve, it divides just above the fetlock into the two.

Pastern or *lateral arteries,* each of which passes over its opposed sessamoid bone, behind the vein at the lateral part of the pastern, tending rather posteriorly. The pastern nerve which accompanies each is situated posteriorly to it; so that the pastern artery passes between its fellow vein and nerve; which is of importance to remember in some operations on these parts, particularly in that of neurotomy, lately so much practised. See *Plate of Feet;* see also *Neurotomy.*) The pastern arteries having passed over the sessamoids, usually form a small branch to furnish the posterior parts of the pastern, and a more considerable one which divides and furnishes the anterior part of the joint: sometimes there are more than one of these anterior branches. When arrived at the coronet, near the upper point of the cartilage of the foot, each gives off a branch, called the *coronary*, which passes in front, surrounding the anterior of this part, plentifully supplying its vascular ligament, and anastomosing with the opposite one. Near to where the coronary is given off, another ramus runs backwards and downwards within the edge of the lateral cartilage, and is distributed throughout the fleshy frog. Having given these branches, they are continued within the cartilages to the posterior part of the coffin bone, where they ramify within it and the sensible laminæ. The lesser branch is continued in a groove in the inferior process, curving over the lower edge of the bone, to be ramified on its under surface. The posterior branch of the main division finds a passage within a groove at the convex surface of the coffin, behind the line of insertion of the flexor tendon, being distributed both to the soft parts and to the bone, which it pierces in every direction, anastomosing by this means with the branches on the anterior surface.

The *right branch of the anterior aorta* is considerably larger and longer than the left. The branches arising from it have been noticed. The *bronchial arteries* we only named in speaking of the general division of the aorta. Their origin is not invariably alike: sometimes they arise as already mentioned; at others, they are given off from the posterior aorta, and now and then from one of the intercostals. They pass one on each side to the right and left lung, and appear to be distributed on the ramifications of the bronchia, to secrete the bronchial mucus. We have already noticed that the right division of the anterior aorta, after having given these different branches, furnishes the trunk of the *carotids*, and then ends in the axillary. We shall now trace these vessels, following nominally, one only, as they are both similar in distribution.

The *carotid* common trunk, arises from the right branch of the anterior aorta, and soon divides into two portions. Each carotid is a very long vessel, whereby the strong action of the heart is counteracted; and hence the horse is less liable to affections of the head than ourselves, in whom these vessels are infinitely shorter. There are only a few insignificant rami given by this artery, before it approaches the head, when it divides into what are termed the external and internal carotids; which designation they receive more from the parts they furnish, than from their immediate situation.—The *internal carotid* does not arise exactly the same as in the human; for in man the external gives off some considerable branches first; but in the horse, this vessel appears rather to divide at once, without previous branchings. This internal division is very contorted in its course before it enters the skull, which it does by a large foramen near the junction of the sphenoid with the cuneiform process of the occipital bone: by its tortuosities the blood sent by it to the brain cannot be too much accelerated; nor by this contrivance can accidental pressure deprive the brain of its support. As it enters the base of the skull, it gives a branch, which uniting with a similar one from the vertebral, forms the *circulus arteriosus.* It anastomoses likewise with the internal carotid of the other side, as well as gives branches to the adjacent parts, and finally it ramifies throughout the anfractuosities of the cerebrum and cerebellum.

The *external carotid* first gives off a branch to unite with the vertebral, which has also been called the *occipital,* and which branch, as it passes up, gives several rami to the parts around, and furnishes one or two twigs that enter the skull; likewise two or three to the internal and external ear; and a branch also to the parotid gland. The principal trunk then makes a curve, and, passing over the os hyoides, it gives off a considerable branch, which has been named the *posterior maxillary,* principally furnishing the masseter muscle: it likewise parts with *the temporal,* which is erroneously supposed to be distributed to the eye; and as such, has been recommended to be taken up in inflammations of that organ, but which is wholly spent on the upper part of the masseter muscle. As this forms a considerable error in the practice of some veterinarians, the real distribution of this vessel is carefully marked in the plate of Splanchnology. The parent trunk, which is then called the *internal maxillary,* is continued under the parotid gland, giving first a branch to the pharynx, next the *sublingual* or *ranine* to the tongue; and sometimes another ramus or two, before which a large branch passes off to the *external* part of the face, and which we will trace last. Having parted with this principal branch, the *internal maxillary* next gives a considerable twig, which after entering the posterior maxillary canal, in company with a portion of the fifth pair of nerves, to furnish the teeth with their blood, emerges at the symphysis of the chin, and loses itself in the muscles of the lips. The remaining trunk then passes through the sphenoid bone, along the junction of the palatine with the maxillary bones, where it forms the *palatine artery,* and ramifies around, giving rami which enter the brain, and others to the nose. The *external* branch of the internal maxillary, which might, with propriety, be called posterior facial, is an important vessel, not only from its magnitude, *but from its forming the most convenient part for examining the pulse of the horse. (This vessel, with its exact situation, is* *shewn in the plate of Splanchnology, where it is the middle vessel of the three, as it comes from the under edge of the jaw, and then crosses the parotid duct, passing upwards towards the eye. See also, o, Plate* III.) It passes over the posterior jaw near where the tuberous part ends, proceeding upwards, when it branches usually into three principal divisions, which are evident in the plate: the first of these is generally given to the masseter, anastomosing with the temporal: the next may be called the *nasal,* which furnishes the superior and external parts of the nose; it also gives some branches which communicate with those given to the internal parts of the nose from the palatine. It likewise gives a ramus that runs up to the angle of the eye, communicating with some branches from the inside of the skull. This ramus is, from this course, called the *angular,* and is the proper branch to divide in inflammations of the eye, and not the temporal, which is sometimes done: for the ramifications of the angular are particularly distributed to the coats of that organ; whereas the temporal artery, as we have already shewn, is given wholly to the masseter muscle.—The third division of the posterior facial, or external branch of the internal maxillary, is the *labial,* which is the most inferior of the three, and passes down to furnish the muscles and parts below.

The Posterior Aorta.

The *posterior aorta* is continued from the division of the great trunk posteriorly *(see Plate of Splanchnology, but where there is too great a mark of incurvation),* inclining to the left side of the vertebræ, nearly as far as the sacrum.——*Ductus arteriosus.*—The aorta, where it passes posteriorly, having a slight curve over the pulmonary artery (*see Plate* IV), presents the remains of a canal, by which, in the fœtus, it communicated with that artery, but which in the adult becoming shrunk and closed, appears now only as a slight ligamentous connexion.

The *intercostals.*—The first three or four of these vessels are furnished from other sources; the remainder arise from the posterior aorta, from each side posteriorly, as far as the diaphragm. They are continued on the inner surface of the intercostal muscles, at the posterior edge of each rib, nearly as far as the sternum, furnishing the intercostal muscles in their course. It is evident from this distribution, that in any operation on the ribs, we should be cautious to avoid cutting on their posterior edge. —The *phrenics* are two arteries given off to the diaphragm as the aorta passes the crura of this muscle.——The *splenic.*—This vessel forms a great variety in the horse from the human. In man, the splenic is a branch of a considerable trunk, which furnishes this as well as the coronary, the hepatic, and the gastric, and is itself called the *cœliac;* but corresponding to which there is no such artery in the horse. In this animal the splenic arises from the aorta, and besides furnishing the spleen, it gives some branches to the stomach, the blood of which is likewise returned by the splenic vein; but it does not furnish the pancreatic, which arises usually by a distinct branch.—The *gastrics, right and left,* arise generally by one trunk. The *right gastric* passes along the great curvature of the stomach, distributing its branches over it, which anastomose with the coronary. The *left gastric* is distributed to the lesser curvature and other parts of the stomach.—The *pancreatic* is in the horse generally a distinct branch from the aorta, furnishing the hepatic to the liver, and the coronary which supplies the duodenum, and the pyloric extremity of the stomach.—The *hepatic artery,* derived from the pancreatic usually, is so small, that it is evident it can only furnish the liver with pure arterial blood for its support, but not with blood for its secreting offices.—— The *anterior* and *posterior mesenterics* are two considerable branches given off from the aorta at some little distance from each other. The former is distributed to the mesentery, small intestines, and a small branch to the pancreas.—The *posterior* is likewise a considerable trunk, and furnishes the large intestines and mesocolon. These two arteries anastomose freely with each other by a particular branch, and surround the intestines, so as to form a network of vessels. (*Vide k, Plate* IV.) In this artery there have been found worms, particularly in asses.—The *emulgent,* or *renal arteries,* are very considerable trunks given off, one from each side of the aorta. The right is considerably longer than the left, on account of the situation of the aorta, and its inclination to the left side of the vertebræ (*vide Plate* IV, where these vessels are displayed). It is likewise usually more anterior than the left, from the kidney of this latter side being pressed backwards by the spleen. The emulgents are large, and part from the aorta nearly at right angles, by which the circulation is retarded, for the purposes of secretion. They run almost in a direct line to the kidneys, and divide in the depressions of those glands into several branches, which are ramified throughout its secreting portion. The *capsular* are two small arteries usually arising from the emulgents, anteriorly, and distributed through the renal capsules.—The *spermatic* are two small arteries given off from the aorta soon after the emulgents; connecting themselves to the spermatic veins by cellular tissue, they are continued down to the abdominal ring, or opening corresponding to what is so called in the human, where they cross the ureters in their passage; and having joined the vasa deferentia, the whole being gathered into one rope by means of cellular membrane, is called the spermatic cord: they are finally distributed to the testicle, to furnish the semen; and thus the division of these arteries as effectually castrates, as removing the testicles themselves. In mares these vessels arise in the same manner, but do not in them pass out of the abdomen, being distributed to the ovaria and fallopian tubes.—The *lumbar arteries* are usually five or six small pairs, which arise from the superior part of the aorta, similar to the intercostals, and are distributed to the spinal canal and lumbar muscles.—— The *iliac arteries.*—When the aorta has arrived to about the fifth lumbar vertebra, it divides into the two external iliacs, or rather it gives them off; and in about three quarters of an inch more, in a moderate sized horse, the trunk divides finally into two larger divisions, called the internal iliacs.—The *internal iliacs* are so called, because they are continued more inwardly towards the pelvis, and because they are principally distributed to the parts within it.—The *umbilicals* are usually the first branches from the internal iliacs; sometimes these arise where the division of the aorta commences. In the adult horse the umbilicals pass under the urethra, and gain the lateral parts of the bladder, to which they give some rami; and then are lost. In the fœtus they are, on the contrary, continued up to the umbilicus, or navel, and carry blood between the placenta and the foal. In some instances they are quite obliterated after birth, and only a ligamentous rope is left; in others they continue pervious to the bladder, as we have described. After this the internal iliac divides into several branches, but whose numbers and distribution are by no means always the same.—The *internal pudendal* is often the next division of the internal iliac, passing between the bladder and rectum, and is principally distributed to the parts of generation.—The *sacral arteries* are frequently, but not invariably the next, and are two or three small twigs, usually arising from one of the principal divisions; they enter the sacral holes, and furnish the nerves and membranes of that bone, and the tail.—The *gluteal* is generally the next pair: each runs along the internal part of the pelvis in company with the sciatic nerve, giving branches to all the parts around, and is finally ramified in the glutei muscles.—The *obturatrix,* or *ischiatic,* forms the next. Each passes out of its proper foramen thyroideum, and furnishes a branch to the corpora cavernosa in the male, and clitoris in the female. It is finally ramified in the articulations of the thigh bone with the pelvis.—The *external iliacs* pass more externally, and likewise furnish parts without the pelvis. They proceed one on each side down the iliac muscles towards the Fallopian ligament, in which course it gives off a *branch to the psoas* and abdominal muscles.—The *epigastrics* are given off within the pelvis; run obliquely upon the tendon of the transversalis, pass forward on the abdominal muscles, and then ramify with the internal pectoral.—The *arteriæ profunda* are given off sometimes within and sometimes without the abdomen: occasionally the epigastrics arise from them. Each is a considerable branch, and runs down on the inside of the thigh, to be distributed to the muscles of the upper part of the extremity.—The *external pudendals* go out by the crural arch, communicate with the internal pudendals, and are distributed to all the external parts of generation, giving branches to the inguinal glands: they are then carried along the penis, to be finally ramified throughout the glans. This artery in the mare furnishes the mammæ, or bag.——The *crural arteries.*—The external iliacs, passing out of the abdomen at the crural arch formed by Fallopius's ligament, receive here the name of crural, and accompany the psoas muscles out of the abdomen. Each crural artery descending along the lateral internal part of the femur, passes for some way in company with the crural veins between the pectineus and sartorius muscles, to about the middle of the femur; where passing obliquely, it gains the posterior part of the thigh, and is continued down behind that bone. In its course, as already mentioned, it sometimes furnishes the profunda, which is distributed to the muscles of the inner side of the thigh, that this grand trunk might not be weakened by too numerous divisions. It usually furnishes some small branches to the neighbouring parts, one of which is given off soon after its origin, and may be called *circumflexa,* as it turns backwards to furnish the joint of the acetabulum, and some of the muscles close to the bone, as well as the bone itself; it likewise gives other small branches. Continuing its course in the ham, between the posterior condyle of the femur in company with the vein, the crural then changes its name to the *popliteal,* which first furnishes a large ramus to the articulation of the femur with the tibia, called *articularis:* after this, the main trunk soon divides into two principal divisions. The *posterior tibial* is one of these, which is continued down the posterior internal part of the tibia, giving the medullary artery in its passage under the flexor minus pedis, accompanying the vein, and likewise joining the nerve in its course, through a groove formed by the calcaneum *(vide* IV, *Fig.* 1, *Plate of the Posterior Extremities):* It passes in this groove in company with the perforating tendon of the flexor pedis muscle: it here gives several branches, the principal of which furnishes the hock, anastomosing by all its rami, but by one more particularly with the anterior tibial: another branch is continued down on the inner side of the internal metacarpal bone, which in its passage gives the medullary artery to the canon. In this passage it may be called the *internal metacarpal,* and which is finally ramified into the integuments and parts at the posterior of the canon and pastern, anastomosing freely with the next.——The *anterior tibial.*—The anterior tibial forms the other division of the politeal, and runs from between the condyles of the femur obliquely to the external superior part of the tibia, passing between it and the fibula, in company with the vein (*vide* 15, *Fig.* 2), where the artery takes its course under the extensor longus pedis; and again becomes evident between its tendon and that of the lateral extensor, passing with them under the annular ligament, giving a branch to furnish these parts, and another that passes backwards to anastomose with the posterior tibial. It here changes its name to the *external metacarpal artery;* which passing from under the ligaments of the hock, is continued down obliquely over the front of the canon, towards the outer small metacarpal bone (*vide* 3, *Fig.* 2), which having reached, it penetrates between it and the canon, and is continued on its inner side under the flexor tendons; in its passage anastomosing with the internal metacarpal, frequently by a direct cross branch behind the bifurcating ligament. Accompanying the nerve and vein, it gains the superior part of the sessamoid bones, when it bifurcates into the two *lateral* or *pastern arteries,* in the same manner as in the fore extremities; being accompanied in its division in the like manner by the veins and nerves. The *pastern arteries* follow exactly the same distribution as in the fore feet; we shall not, therefore, pursue them farther, but refer to those.

The Pulmonary Vessels.

The passage of the blood through these vessels is termed the *minor circulation,* and is effected by the pulmonary artery and veins. The pulmonary artery is a trunk of five or six inches in length, growing out from the right, or anterior ventricle of the heart: it is continued upon the side of the aorta to its division; where it is connected with that artery by means of the membranous canal we have described, called *ductus arteriosus:* immediately after which it divides into the right and left branches, whose length is nearly equal, but the size of the left is more considerable than that of the right. Each of these branches is divided upon its entering the lungs into others, which ramify throughout the parenchymatous substance in every direction. From the minute distributions of the artery, the blood is received by the ramifications of the pulmonary veins, when the venal recipient branches increasing gradually, unite into eight principal trunks, which all terminate in the left auricle of the heart*.

The Veins generally.

The veins are vessels that correspond with the arteries in their common office of carrying the blood; but with this difference, that the arteries distribute their blood from the heart to every part of the body, and consequently diminish in their individual diameter as they advance: whereas the veins bring back the blood from the parts the arteries had carried it to, and re-

* In the human there are only six original veins, the two cavas, and the four pulmonary. In the horse, on the contrary, there are ten original veins, which are the two cavas, and the eight pulmonary. It is remarkable, that neither Bourgelat, La Fosse, nor Vitet, notice this peculiarity in the animal from the human.

store it to the heart; gradually enlarging in their calibre as they advance. They may, therefore, be considered, as long membranous canals arising in every part of the body, and terminating in the heart. Their fabric is much more slender than that of an artery, allowing the colour of the blood to be seen through them, and never preserving their cylindrical figure when empty: nevertheless, they have very considerable strength, and though their coat may become distended, yet they very seldom burst. The number of the veins is greatly superior to that of the arteries in general. In some few instances, as in the lungs, the proportions are equal; but in others, as in the extremities, the veins infinitely exceed the arteries in number. Their quantity is always, however, correspondent to the uses of the part, and to its liability to pressure. They are composed of two principal coats, the outer of which is either muscular, or of the nature of the elastic tunic of the arteries. Blumenbach contends for their muscularity; but he was only able to detect this structure in the largest trunks. Certain it is they are highly elastic, as we know by their returning to their original size after the distention of exercise, or when a ligature has been applied. As the venal trunks are subject to pressure from muscular action, and as their coats are not strong, like the arteries, to resist it; and as likewise the stoppage of the blood would be attended with the greatest inconvenience; so there are two orders of veins, a *superficial* and a *deep seated;* but which communicate with each other by anastomosis*. The superficial order, which is not so numerous as in the human, runs immediately under the skin; and are those vessels which become so prominent on violent exercise. This appearance judicious painters always express when they depict a horse either in action, or immediately after it; by which nature is followed, and great force, beauty, and strength, given to the representation. But ignorant painters seeing this, have fallen into great error; for it is not unusual to see two portraits of the same horse, one under circumstances of the greatest exertion, the other perfectly at rest, with each the same number of superficial veins, swelled and prominent alike. To avoid the evils of pressure, another speciality is observed in the veins, which is that some of them, particularly about the jaws, whose almost constant motion required it, enlarge into sacs or cavities, to prevent the hurtful effects of distention. The deep-seated order accompanies the arteries in their course, lying alongside of their trunks.

Veins, having less solidity in their coat, are provided with

* Mr. Perceval gives a familiar and good practical illustration of this. If, for example, you are drawing blood from the shoulder of a horse, and you take up the other fore leg, you know that the blood will flow in a much freer stream than if you allow the animal to favour the limb from which you are taking it; for, by making him exert the muscles of the bleeding leg, the blood is pressed from the deep-seated into the superficial veins.—*Lecture VI.*

membranous projections called valves. A valve appears a duplicature of the inner coat of a vein, rising into a kind of curtain or fold, of which folds there are in the human seldom more than two, but in the horse often three. The valves are so formed, that the blood passing forward, keeps the vessel continually open; but when, by pressure, the fluid is stopped in its course, the valve is pressed backward, and by that means expands, and prevents the return of the blood. These valves are not distributed equally throughout the venous trunks, but are much more universally placed in the horse than the human: in some they are rather more numerous, in others are entirely wanting, as in the foot, where the arterial force is sufficient without them. They exist in most of the cutaneous veins, and in most of those of the extremities, except the parts we have mentioned; but there are but few in the viscera, nor are there any in those parts where the circulation is necessarily very slow, as in glands. The origin of veins is not so numerous as the terminations of the arteries. Four are well known to us: they spring from the inner surface of those cells into which the arteries have previously terminated. They arise also from larger cavities or sinuses: they also terminate by direct continuity of canal with minute arterial branches. The fourth is a more complex origin, being from the termination of other veins, as the vena portæ. Veins, like arteries, are furnished with arterial blood for their support, by the vasa vasorum, which is returned by corresponding little veins, termed venæ venarum. They have also their nerves, and undoubtedly their absorbents also. The blood is returned to the heart by a regular flow, at least no pulsation has ever been satisfactorily detected; nor have the veins, that we know of, any contractile power, beyond their elasticity.

Of particular Veins.

The original trunks in the horse are ten; which are the *anterior* and *posterior cavas*, and *eight pulmonary:* to which may be added, the *venæ portæ.* We shall first consider the two cavas.

There are two modes of describing the veins, beginning either by their extremities, and following the course of the blood, tracing their gradual augmentation, and final termination into the right auricle of the heart: or by beginning at the heart, and proceeding to the extremities. The former appears the most correct, and has been followed by some of the most eminent anatomists: but as it is to be considered that the arteries, by having been already described in their proper course, give a considerable key to the knowledge of the veins, which in most cases accompany them, which advantage, if this description were reversed, would be in a great measure lost; so to avoid this I shall consider the veins as vessels merely springing from the heart, and distributed as the arteries to all parts of the body, without reference to the course of the blood within them.

The real origin of the *cava* has not, by comparative anatomists, been described sufficiently: It is spoken of, as though it arose by one trunk, and then divided; whereas it goes out of the heart by two trunks, from separate parts of the right auricle opposite to each other. *(Though their immediate origin cannot be seen in the plate, it can be readily discovered that they arise in this manner.)* That which arises from the anterior portion of the auricle, forms the anterior cava; while the other from the posterior part, forms the posterior cava. The anterior chiefly furnishes the chest, fore legs, and head. The posterior is principally distributed to the belly, and hinder extremities.

The *anterior cava* arises from the anterior and superior portion of the right auricle: as it passes forward, it inclines a little superiorly, penetrating the pericardium. Opposite to the first rib it divides into four principal trunks, two of which (the axillary) go off at right angles, and two at half right lines with itself, which are the jugulars. The axillaries, the first division of the aorta, are two principal trunks passing over the first rib. But before these general distributions of the anterior cava, it gives some smaller trunks which receive blood from parts corresponding with the branches given off by the aorta in its passage. The principal of these is the *vena azygos,* which passes on the right side of the dorsal vertebræ, and receives the blood from all the posterior intercostals on each side. The *vertebrals* are given off opposite to the second rib, and pass at the base of the transverse processes of the cervical vertebræ, giving branches between these bones in the same manner as the arteries whose blood they receive, and anastomosing with the jugular. The rest of the branches are the superior intercostal, the dorsal, mediastinal, superior diaphragmatic, and internal pectoral, whose mode of origin frequently varies. This branch of the cava then divides, as we have mentioned, into the two axillaries and the two jugulars.

The *axillaries.*—The first general division of the anterior cava, is by two principal trunks which pass over the first rib. In the human they are called subclavian, because they pass under the clavicle; and Vitet has very erroneously named them *sous claviere* in the horse also, which has no clavicle: nor have these veins the same unequal length as the human subclavians, as the situation of the cava at their division is not so far to the right; yet still the left is rather the longest. Passing before the axillary artery each gains the humerus, giving in its passage the *external pectoral,* and some other branches corresponding with, and receiving the blood of the branches of the axillary vein. Having gained the articulation of the shoulder with the humerus, the axillary takes the name of humeral.

The *humeral* pours its blood into the axillary, sometimes in one, at others in several trunks: when it arises from the axillary in one, it soon after divides into several branches, which are distributed to different parts of the upper portion of the extremity. The principal branch descends towards the posterior part of the radius, where it takes the name of *radial,* in company with the artery; first giving a branch to the posterior part of the fore arm called *ulnar,* and sometimes a deep seated one in front also; then passing down in company with the artery, it anastomoses freely in its course with the cephalic, or external vein, and is continued downwards together with the metacarpal artery; when it receives the name of *internal metacarpal,* as the united trunks of the other branch and cephalic do that of external *metacarpal.* The external and internal metacarpal veins usually unite to form the *external* and *internal plantar* or *pastern.*

Besides these divisions of the deeper seated vessels, there is a superficial order situated on the surface of the extremity. The *superficial set* arises from the jugular, usually in one trunk, soon after its origin: passing under the axillary gland, it travels from the chest downwards, towards the point of the shoulder, where it crosses the muscles of the arm; or rather it runs down the biceps muscle, where it usually gives a branch to run superficially, directly in front of the arm; the principal branch is then continued inwardly towards the inside of the arm, forming what is termed the *cephalic,* or *plate vein.* (*Vide n, Fig.* 2, *Plate* VII). It is this vein farriers usually open in drawing blood from the shoulder or arm. It here receives a branch from the humeral, soon after which, it in some instances divides into two rami; in others, it is continued down in one united trunk on the inner side of the radius, but superficially. Near the knee, it frequently, likewise, divides into two, which surround the inner side of the joint, but unite again below it, and pass down on the outer side of the ligament, receiving branches from the integuments, and anastomosing with the deeper seated trunk: when arrived at the bottom of the canon, it unites with the internal metacarpal, when the united trunks bifurcate to form the *external and internal plantar,* or *pastern,* as has been before described. The subsequent course of the veins from the pastern downwards, is similar to that of the arteries, except that their branches are much more numerous; by which and by the absence of valves in the veins of the feet, the evils of pressure, to which they are here peculiarly liable, are avoided. The *jugulars* being part of the principal divisions of the anterior aorta, as we have said, run up one on each side the trachea: In their passage they give a considerable branch soon after their bifurcation, which is the cephalic, or plate vein, just described. Having given these branches, and furnished the parts in their passage with small rami, of which the principal is the *thyroid;* towards the head they penetrate deeper, and approach the carotids: when arrived opposite the angle and tuberosity of the lower jaw, about three or four inches from it, they bifurcate into two grand divisions, within which bifurcation lies one portion of the parotid glands (See *Plate* IV). The lower branch may be called the inferior division of the jugular, and the upper branch the superior division. It must be remembered, that the distribution of blood to the head of the horse and man is different; in the former there is no internal jugular properly so called; but the vein performing the office of the internal jugular is a branch of the superior division. This vessel dilates under the masseter, and in other parts of its passage about the jaws, into sacs not unlike aneurismal enlargements of the arteries, purposely to avoid the effects of pressure arising from the almost incessant motion of the jaws.—The *inferior division of the jugular* (see *Plate* IV) corresponds with the anterior external jugular of the human, and is called the *internal maxillary;* passing inwards, it gives some small branches to the larynx and tongue, and then passes over the jaw to its outer side: running up the anterior edge of the masseter muscle (see *Plate*), it gives a branch to the lips, while another enters a foramen in the lower jaw that extends to the chin, into which this branch enters, with a branch of the fifth pair of nerves, and an artery, to furnish in their passage the teeth of this jaw. Passing up, it makes usually three principal divisions, at other times more, and sometimes less.—The *first branch* penetrates the attachment of the masseter to the spine of the maxillary bone, and running under this spine, gives a ramus that forms the palatine vein; it then penetrates the orbit under the zygomatic process, dividing into several ramifications. The *second division,* which is the posterior of the upper bifurcation (see *Plate* IV), passes inwards under the spine, to meet the temporal vein with which it ramifies, and then gives a branch to form the *angular vein,* and sometimes likewise another that enters the skull. The *other and most anterior* of this superior bifurcation gives its ramifications to the nose. As this branch of the jugular comes under the jaw towards its outer side, it changes its name, and is properly the *external maxillary,* as it accompanies the maxillary artery. The *superior division of the jugular* passes up between the lobuli of the parotid gland, and through it, furnishing it with ramifications; and in this course it forms divisions, which are not always alike; there, however, usually appear three greater trunks, and one or two less. (See *Plate* IV, *where the larger divisions appear.*)

The first of these greater divisions is considerable, and corresponds in office with the internal jugular of the human. It penetrates under the maxillary bone, and is the branch seen in the inner view of the head (*Fig.* 2, *k*), entering by a foramen, at the base of the skull; sometimes it gives the temporal vein. The next branch furnishes the masseter muscle, in company with an artery, called the *external maxillary.* The third large division gives, at times, the temporal vein, which is that seen in *Plate* IV *(f)*; it passes under the spine of the maxilla, and anastomoses principally with the external branch of the internal maxillary. The other branches of this third division proceed towards the occipital bone, &c., and give rami to the inner part of the skull at the cerebellum.

The Posterior Cava.

The blood is returned from the lower extremities, from the abdomen, and from the thorax below the heart, by the vena cava and vena porta. The vena portarum returns the blood of the chylopoietic and assistant chylopoietic viscera, which are those particularly concerned in the formation of the chyle; while the cava returns that from all the other parts. The *vena cava posterior* is sent out from the posterior and lower portion of the right auricle, having but a very small part of it contained in the pericardium. It gives first the *coronaries,* which return part of the blood of the coronary arteries; and as it proceeds it is continued on the right side of the spine, inclining rather towards the aorta. Passing through the tendinous portion of the diaphragm, rather to the right side, it gives two or three branches to this muscle; from whence it proceeds through the great sinus of the liver, where it receives the hepatic veins, which are indefinite in their number, but are always numerous and considerable. From the liver, the cava is continued to the loins, approaching the aorta, where it receives the *mesenterics**, *emulgents,* and the *right spermatic;* the *left* usually enters the left emulgent, to avoid the disadvantageous course it must otherwise pursue. In the mare the spermatics are given to the ovaria, but, in the horse, they accompany the artery out of the abdomen with the spermatic cord. The emulgents usually give the *renal veins,* which receive the blood from those glands; and the *lumbar veins* next accept the blood given by the arteries of that name.

The cava having arrived at the termination of the lumbar vertebræ, bifurcates; from which results the *external* and *internal iliacs.* The internal furnish the pudicæ internæ, and sometimes the veins of the penis, which receive the blood distributed by the corresponding arteries. They likewise usually furnish the *sacral veins.* The external iliacs give numerous branches answering to those from the arteries of the same name: the *uterine* arise from them. In the male, a branch is usually ramified on the tunica vaginalis of the testicle. Other branches are the *glutei,* the *obturatrix,* and *pudicæ externa;* and a particular branch to the muscles of the abdomen, as well as the *mammary* in the mare. Passing out of the abdomen with the

* Haller found valves in these vessels, as well as in those he has called hæmorrhoidal.

psoas muscle, under the Fallopian ligament, the external iliac takes the name of crural in company with the artery.—The *crural vein* accompanies the artery out of the abdomen, when, passing between the pectineus and sartorius muscles, it first gives a branch that principally forms the superficial set of the posterior extremities, called *saphena major,* and a smaller one on the outer side, not always present, called *saphena minor.*—The *saphena* appears along the internal part of the thigh, just under the skin, giving branches to the integuments, one of which is considerable; likewise a branch communicating with the posterior tibial, when passing down the inner side of the leg, it usually receives a considerable ramus from the anterior tibial; and is then carried obliquely towards the inside of the hock, over the inner condyle of the tibia; at which part, passing over the bursa mucosa, it is liable, on the diseased enlargement of that capsule, to become varicosed, forming what is called blood-spavin. From this it gains the canon posteriorly in a similar manner with the artery, on the outer side; where piercing between the large and small metacarpals, it unites with the posterior tibial, giving branches to all the surrounding parts, and to the canon, pastern, and foot.—The *little saphena,* when present, receives the blood from the external side of the hock and tibia, which it pours into the saphena major. The crural or femoral vein, having gained the posterior and lower part of the femur, in the same manner with the artery, receives the name of popliteal.—The *popliteal* divides into two trunks, which sometimes form each of them into two or more branches, distinguished by the names of anterior and posterior tibial.

The *posterior tibial* accompanies the artery, receiving branches from the surrounding parts, and passing in a groove of the calcaneum with the tendon of the perforatus muscle (see *Fig.* 1, *Pl.* VIII) where the nerve is seen that accompanies it, though the vein is not, but which shews its course. From its passage at the posterior part of the hock, it gives branches to the surrounding parts, and receives the name of *internal metacarpal.* It is then continued down the posterior part of the canon, towards the inferior part of which, it receives the saphena, and then dividing with the artery, it forms the pastern veins, in the same manner as in the fore extremities.

The *anterior tibial vein* accompanying the artery, passes with it under the edge of the extensor longus pedis. In this course it gives a branch to the saphena, and then furnishing the anterior part of the hock, it passes down under the ligaments to its posterior part on the outer side, from whence it is called *external metacarpal.* It gives in this course branches to the surrounding parts, and is continued to the pastern and foot, but principally to the canon and pastern. From the pasterns the veins proceed into the feet, and are most plentifully ramified throughout them, by which the pressure those vessels must experience is rendered harmless; the blood being enabled to escape in every direction by the total absence of valves in the veins of the feet.

The Vena Portæ.

The *vena portæ* is formed from the veins returning the blood of the viscera, concerned in the formation of the chyle; as the stomach, the pancreas, the spleen, the omentum, the mesentery, and the intestines. The branches by which the blood from the different viscera is returned, correspond in origin and distribution with the arterial trunks by which they are furnished; but they are more numerous, and their diameter is enlarged. Having united, they enter a sac, called the sinus of the vena portæ, from the opposite extremity of which, the other trunks branch out to carry their visceral blood into and throughout the liver. The trunks that bring the blood from the viscera, are called the *abdominal portions* of the vena portæ; while those carrying it directly into the liver are termed the *hepatic portions* of the same vein. From this it is seen, that the vena portarum performs the office of an artery; resembling it by its termination in exhalent orifices, and corresponding recipient veins. The blood deprived of its bile in the pori biliarii is returned by the extremities of another set of veins, which are termed the *venæ hepatica*, and which terminate in the vena cava, as we have noticed. In the human, and in all quadrupeds that we are acquainted with, but the horse and ass, there is in the fœtus a communication between the sinus of the vena portæ and the vena cava, by a canal termed *ductus venosus:* but in the horse and ass this is wanting, and all the blood of their viscera circulates through the liver in the fœtal state.

General Remarks on the Vessels.

The blood vessels, like other parts, are liable to diseases. A very general one affecting the arteries is the *distention* they experience under inflammation, when the capillaries are made to receive red blood. This forms the most general affection to which they are subject, for they are but little liable to *aneurism*, or *ossification* in the horse, though now and then both have occurred. They are subject, in common with other parts, to injury, as from wounds; in which case they may either be simply punctured, or their whole trunk divided. We have before remarked, that from the greater degree of tenacity of life, and the superior quantity of muscular coat to the arteries in the horse, the division of a very considerable branch will not prove fatal. An artery wholly divided is also less dangerous than one partially so, because, when wholly divided, it recedes under the integuments, and contracts. The division of a vein likewise is not so dangerous as that of an artery, as it usually gives way to pressure, or to applications producing coagulation in the external orifice; but which coagulation does not so readily take place in the arteries, from the greater impetus in the blood, and the rapidity of its motion.

The principal diseases that the veins are liable to, appear to be occasioned by causes operating on them from without. One of these is called *blood spavin*, and is a simple distention of the vein from the resistance which the contained blood meets with in passing over a dilated capsule at the inner and fore part of the hock, called a *bog spavin*. Another common disease of veins is an *inflammation of their coats*, usually the morbid effects of blood-letting. The veins of the feet are also liable to become varicosed from pressure, and from inflammation, as in strains, cracks, grease, &c. From grease they are very liable to become diseased; when the cutaneous ones are at times totally destroyed, and the others consequently much distended, which must likewise tend to aggravate the disease itself, the returning blood being carried on still more slowly: nor is it improbable that a varicosed state of these vessels may be one of the causes of grease.

It has been a very antient custom among ignorant farriers, to take up the veins in different diseased affections; or what they term, to *bar a vein*, particularly in œdematous swellings. This practice is founded in ignorance; for in grease, scratches, inflamed eyes and feet, which are the usual cases in which it is done; it is evident, that every thing that obstructs the return of the blood must highly aggravate the disease: if, therefore, instead of destroying a vein, they could in these cases add two or three, they might do much towards a cure.

The Absorbents.

The *absorption* of matters from within and without by a set of vessels destined particularly to that office, is comparatively of late discovery; for though a vascular system distinct from the blood vessels was long known*, yet its uses were not even conjectured at: until a milky fluid was discovered soon after eating in such of these transparent tubes as originated from the intestines. These received the name of *lacteals;* sometime after others of these, which had been traced to arise from the body generally, and were constantly found filled with a thin limpid fluid, were named the *lymphatics*. Subsequent discoveries have, however, given reason to suppose that neither in structure or functions is there any real difference between these two sets of absorbing vessels; but that both are destined, by a common mode of action, to receive fluids from the part

* As early as the time of Galen, lymphatic vessels were seen in a goat by Erasistratus, who considered them as a peculiar species of arteries. Eustachius discovered the thoracic duct in a horse, which he considered as an extraordinary vein *(vena sive pari)*: Riquet traced the chyle from the intestines into this duct, and thus became acquainted with its uses.

their ramifications are spread upon, and to carry such fluids by one common destination into the blood. By what means this is effected we know not. It was for some time attributed to capillary attraction; but this is now disbelieved, and absorption is considered to be a power *sui generis*, operated by the action of the vessels themselves. To effect this their tunics or coats* are necessarily very strong, and their powers are further assisted by valves, which are numerous and placed at convenient distances†. To compass their extensive office, they divide themselves into a superficial and a deep seated set, both of which anastomose freely with each other: the former set usually accompanies the principal external veins, while the latter is found near the principal arteries. Their living powers are great, from their plentiful supply of blood vessels and nerves‡; of which the phenomena of their great energy in health, and their readiness to inflame and consequent sensibility under disease, are sufficient proofs.

The *lacteal absorbents* are that part of this system which arises from the inner surface of the intestines, particularly from the small ones, by means of the villi, which appear to be principally composed of numerous lacteal orifices, from whence they pass in minute capillary tubes obliquely through the intestinal coats to gain the mesentery, uniting as they proceed into larger trunks, which are continued through conglobate glands situated in it, and thence called *mesenteric*. During this course they are called *primary*, or *original lacteals;* and as they again pass out of these glands towards the thoracic duct, they are called *secondary lacteals*. Those of the small intestines proceed to the roots of the mesentery, where, uniting into an indefinite number of considerable trunks, they accompany the mesenteric artery, (see *Plate* IV) from which they proceed by the side of the aorta, and terminate in the *receptaculum chyli*. Those of the large intestines, and which are very numerous in the horse,

* Mr. Cruickshanks conceives that the absorbents have two coats; others attribute to them an external elastic, a middle muscular, and an internal smooth and membranous: by the former they can recover their dimensions after distention, and by the latter their contents are propelled forwards. Their muscularity is proved by their contractile power when externally irritated.

† The valves are disposed in pairs, but not equidistant; some parts have few, and in some they are numerous. A valve does not appear to take on disease so readily as the vessel itself; from which it has been conjectured to be of a different structure to the internal surface of the tube itself. Farcied buds are said to be the ulceration of the obstructed lymphatic, intercepted by the valve: but now and then I have seen the valve itself form the bud, and more often a small lymphatic gland has received the infection and become enlarged. Valves tend to intercept the weight of the column, and thus assist their power generally; they also effectually prevent any retrograding of the lymphatic contents.

‡ Although nerves may be distinctly traced to ramify on their larger branches, yet some experiments go to prove that these vessels can act without the influence of the nerves.

arise by trunks which pass up the vertebræ with the aorta, and empty themselves into the same receptacle with the lymphatics.

The *lymphatic absorbents* are more universally though not equally distributed, some parts being more plentifully supplied than others: and although they have never been demonstrated in the brain, there is no reason to doubt of their existence in that, as in all the organs of the body, the cuticle, hair, and hoofs excepted. The lymphatic absorbents arise from the cells of the universal investing membrane of the body; they also originate from all the great cavities of the machine, and take up the fluids deposited there by the arteries. Some of them take their rise from the surface of the skin also: thus various substances rubbed on the skin produce effects exactly similar to those arising from the reception of the same substances into the stomach.

The *lymphatics of the head, neck, and fore extremities,* all of them present a superficial and a deeper seated set. In the head they arise from all its parts, and, passing down the neck, some accompany the carotid artery, while others are situated more superficially. Those of the fore extremities arise from the sensible parts within the hoof, and pass up on each side of the limb; the deeper seated in company with the metacarpal and radial artery. The superficial is principally situated on the inner side (*vide Plate* VII) which it traverses to reach the axillary lymphatic glands within the neck (near the origin of the saphena vein), which it penetrates in company with the deep seated branch to again emerge and join the chylous receptacle.

The *lymphatics of the hinder extremities* arise like those of the fore, and pass on each side of the pastern and canon on the outer side of the ligaments: when arrived at the hock, their principal trunks, which are numerous, proceed up the inside of the thigh till they reach the inguinal glands, which are situated in the groin near the scrotum in the horse, and the bag in the mare. The lymphatics of the penis and muscles of the abdomen are poured into them here, from whence the whole again pass out and enter the abdomen with the crural vessels. The glands of the groin vary in number and size; and it is worthy of remark, that there are but few lymphatic glands of moment between these and the feet. *Deeper seated lymphatics* also follow the course of the deep seated vessels, and unite with the others in the inguinal glands. Arrived within the pelvis, they receive ramifications from all the surrounding parts: proceeding in company with the aorta in several considerable trunks, they enter the receptaculum chyli.

The *absorbent glands* are vascular oval bodies, so intimately connected with the absorbent system, as well lacteal as lymphatic, as to be generally considered as an integral part of the system itself. Their size differs considerably: some are minute, others are much larger, as we know by what we call the kernels in meat; their structure is cellular, and each has an investing capsule. When an absorbent enters a lymphatic gland, it first divides itself into several branches, all of which then ramify throughout the inner surface of its cell: other ramifications again take their origin from the opposite sides of the same cell, to be continued forward; but what purposes are intended to be accomplished thereby we do not at present know. The absorbent glands of the lacteals are called *mesenteric**, and those of the lymphatics receive the name of *lymphatic*† glands. The chylous receptacle, which we have described as receiving the joint product of this system, contracts itself into a tubular form, and is continued under the name of *thoracic duct*. In some cases it has more than one trunk, but which always unite in their passage along the spine, entering the chest between the crura of the diaphragm, and continuing in company with the vena azygos, between the aorta and vena cava, to terminate obliquely into the left jugular vein near its junction with the axillary, and sometimes into the junction itself.

The *physiology of the absorbing system* is very important, not only as it explains many heretofore inexplicable phenomena in the economy, but as it very greatly increases the range of power in the healing art. Mr. Hunter was at great pains to elucidate the process of absorption, as exclusively operated by the lymphatic system, which process had been heretofore attributed to the veins; and for a long time his authority, with that of others, served to give this theory very general credence. Of late, however, some of the most eminent physiologists have again been disposed to attribute some of this power to the veins, yet in a more partial degree than before; and the facts brought forward appear to support such a supposition‡: but

* The mesenteric glands are by no means similarly disposed alike in all quadrupeds; in some, as the dog, instead of being dispersed as in the horse, they are collected into one mass, called, after its discoverer, the *pancreas Asellii*.

† The lymphatic glands appear, contrary to the quality of the valves, to be more disposed to disease than the lymphatic tubes; as we see by the absorption of cantharides in blister: some morbid poisons likewise, as the venereal in the human, and the malignant epidemic in cattle, occasion abscesses in the glands without affecting the vessels by which they passed. In the human subject the mesenteric glands are more prone to disease than the lymphatic, but in the horse the contrary is the case.

‡ Haller favoured the opinion that the lymphatics were only a peculiar continuation of the arteries or veins, and others have since adopted the same supposition; among whom Dr. Majendie stands foremost in experiment and argument. He considers that there is a true distinction between the lacteals and lymphatics: the former he considers as real absorbents, but that they invariably confine themselves to the absorption of the chyle. Thus he supposes the villous surface of the small intestines to be formed, partly from these, and partly from venous orifices; by which latter the remaining fluids are taken up. He also argues that the general absorption of fluids from cavities and surfaces cannot be proved, but, on the contrary, he thinks may be effectually disproved, and which he elucidates by many curious experiments; for which we would refer the student to the 2d vol. of *Précis Elémentaire de Physiologie*.

although the work of absorption may occasionally be performed by veins, it is certainly principally operated by the lymphatics; and until they were known, not only were we unable to account for many appearances that we now know the cause of; but we were unable to bring about many effects in the constitution, now perfectly under our command. It is by these that the most surprising changes are also naturally effected in the constitution. From numerous facts, we are certain that the various organs of the body are continually changing, wholly or partially, their component parts, either for renovation or alteration. It appears that the office of the arteries is to build up new parts, and to repair the waste of others; but the old ones must be first of all pulled down and removed by *absorption**. By this wonderful power the alveoli are removed, when their sharp edges would injure the gums; the roots of the temporaneous teeth are absorbed, that their crowns may more easily give way: by this the gubernaculum testis, having fulfilled its office, is absorbed, and the thymus gland becomes removed. The vascular cartilages are taken up by the absorbents, to make room for a bony deposit when the animal approaches maturity. By these likewise the fluids as well as solids continually change, being taken up, and carried back into the mass of blood, and from whence they are afterwards redeposited by the work of the arteries. It is by these that the dead are separated from the living parts in sloughing and ulceration, and by them coagulable lymph and extravasated blood are removed. By the superficial absorbents, matters are received from without the body also: in insects oxygen is thus received, for smearing their surfaces with oil, by stopping their absorbent pores, suffocates them. Various gases are also thus taken in; and perhaps in this way disease is sometimes produced. Atmospheric moisture is one of the externals readily taken in by the superficial absorbents, and hence grazing horses require little or no water; and especially if not exposed to the heat of the sun, whereby evaporation or exhalation is promoted. It is by this absorbing power that some animals, as rabbits, &c., do not drink at all; taking all their aqueous nutriment by their skin and from the matters they eat. Hence likewise unfortunate mariners, deprived of fresh water at sea, wrap garments wetted with salt water around them; when the absorbents refuse in a great measure the salt, but suck up the aqueous particles, and thereby lessen the thirst. The office of the absorbents is most impor-

* The ratio of action between the depositing arteries and the absorbing vessels, varies according to circumstances, and according to periods of life: in the young the balance is with the arteries, whose deposit during the growth of the animal is greater than the absorption: in middle life their actions are naturally equal, except when influenced by accidental circumstances; while in old age the absorbents preponderate in activity, and remove the parts faster than they are regenerated by the arteries.

tant also in the preservation of life, by their capability of displacing the animal oil or marrow from the bones, and the adeps or fat from the body generally, when an animal becomes accidentally deprived of food. In this way fasting can be borne for even weeks; the constitution being supplied from within through the medium of the absorbents. The hybernating animals live during their torpidity by a slow absorption of animal oil; and it is found, as in the instance of the torpid bear, that however fat they may enter their seclusion, they return lean and emaciated.

We have hitherto spoken only of the *healthy* and *ordinate action* of these vessels: but there appear circumstances under which they have an *unhealthy* and *inordinate action;* and which alone renders it plain that absorption is not to be considered as an act of capillary attraction: if it were, their absorbing capacities would ever remain the same; but we on the contrary find, that sometimes they scarcely act at all, while at others they are empowered with even too much energy; and, as a farther proof of it, we are enabled, by various means, to stimulate or rouse them to increased action. An inordinate action of the absorbents has been supposed to occasion both dropsy and diabetes; and although both of these diseases are now differently accounted for, yet we have reason to believe that the capacity of the lymphatics to receive aqueous fluids from without is not the same at all times. We have also equal reason to know that their action can be rendered to a great degree inert, and that morbid accumulations are a consequence of such want of energy: thus, in some horses, a watery deposit in the legs and heels is very common; and although it may be attributed to an increased action of the arteries, yet the action of the absorbents is evidently defective in these instances, as we know by the effects which arise in such cases when they are artificially stimulated by exercise or friction. The absorbents appear to own a power also of selection with regard to the matters they take up. The lacteals seem particularly and exclusively to employ themselves in the absorption of chyle, and the lymphatics also receive some matters and reject others.

To a knowledge of the properties of this system, the practice of medicine is indebted for some of its most valuable acquisitions; and although we have less knowledge of any mode of lessening an undue absorption, we have many means of increasing it. Mechanical friction is one of them: hence it is that rubbing the legs proves so beneficial in removing œdematous swellings: for the same reason, some farriers beat a splent before they put on a blister. We can likewise stimulate these vessels by mercury; thus it has been common to apply various preparations of this metal to splents, spavins, &c., whereby the bony deposit has been sometimes removed. Pressure also stimulates them; from which it is that we girth horses tight to promote absorption of the adeps and interstitial fluid. Exercise swells the muscles and increases pressure, and thus exercise removes swelled legs in a very little time, and our older farriers used to bind lead on their splents and spavins, that the pressure might promote their absorption. Cantharides has also an effect upon them: thus we blister swellings, exostoses, &c. A still stronger stimulant is the actual cautery; from whence arises the very common and free use of fire in veterinary practice, to all obstinate and diseased enlargements; and which from experience we are aware is the most powerful means of promoting absorption that we are acquainted with. There is likewise a strong sympathy between the stomach and the absorbent system at large, whereby nauseating medicines increase their action powerfully. But of this we are not enabled to avail ourselves in the horse so readily as we can in the human: nevertheless, a nauseating effect is not wholly denied to some medicaments, as we know by the effects producted. Purgatives and diuretics promote internal absorption; for by removing the contents and increasing the serous deposit, a call is made, which the absorbents obey, to repair the waste.

Sect. XIII.

NEUROLOGY.

The Brain and its Meninges.

AT the head of the nervous system stands the brain, which is that soft white mass contained within the cavity of the skull, and invested by membranous meninges or matres, which we shall describe first. The *dura mater* is the most external of these, and by lining much of the cavity of the skull, it performs the double office of a support to the brain, and a periosteum to the cranial bones, to which it adheres very strongly by its tendinous filaments, which are most numerous at the sutures. It forms several folds or prolongations: such is the falx which divides the cerebral lobes. Other expansions form sinuses to receive the blood returned from the interior of the brain; while some of its elongations even leave the skull to line the orbits, the eustachian tubes, and to cover the spinal marrow. The *membrana arachnoidea* appears a very fine external lamen of the pia mater; so thin as to be compared to a spider's web, from whence it takes its name. It is spread uniformly over the surface of the brain, without entering into any of its convolutions, and is connected to the pia mater by a cellular substance. The *pia mater* is a fine vascular web, externally smooth and internally villous; it immediately invests the brain and enters its convolutions, as well as those of the cerebellum and medulla oblongata. It adheres to the dura mater by the veins passing from it into the sinuses; and its numerous fine blood vessels pierce the brain in abundance: its real use appears to be a medium for the transit of blood vessels.

The *cranial brain*, by a natural division formed from its appearances, its situation, and its physiological phenomena, divides itself into two parts. The *cerebrum* is the first and largest portion, bounded anteriorly by the frontal bones, and inferiorly resting on the ethmoidal and frontal cavities (*vide a, e, f, Pl.* III, *fig.* 1). It is anteriorly convex and posteriorly nearly flat; and does not conceal the cerebellum, as in the human*. It it divided longitudinally through its whole extent, into two *hemispherical* portions, between which the falciform process of the dura mater extends. Its peripheral or *cortical* part is greyish, and is exteriorly indented by furrows or convolutions, which in the horse are singularly deep. The interior and larger portion called the *medullary*, is whiter and more tenacious than the outer; and which tenacity is even more conspicuous than in the human brain. On separating the hemispheres, the *corpus callosum* appears, terminating in a species of *medullary arch*, and presenting as it were a nucleus to the cerebrum, and thence called *centrum ovale*. The *tentorium cerebelli* is a transverse septum which divides the cerebrum from the cerebellum. By this septum, the cranium is separated into two portions, a larger anterior and inferior, containing the two lobes of the cerebrum; and a smaller, which is superior and posterior in the usual position of the head. The dura mater laminates at the falciform process, to form a cavity destined to receive the blood which has circulated through the brain. This long triangular venous hollow is called the *longitudinal sinus*, and extends to the transverse septum, where it bifurcates, and is continued double under the name of the *lateral sinuses*, which passing out of the skull, are then called the jugular veins. On making a longitudinal section of the two cerebral hemispheres, on a level with the corpus callosum, two oblong cavities are brought into view, called the *anterior* or *lateral ventricles*, one being appropriate to each lobe of the cerebrum, extending throughout its length. These ventricles naturally contain a very small quantity of interstitial limpid fluid; but under any active excitement of the brain, as mad staggers, &c., this quantity is increased to two or three ounces, and is then often sanguineous. In stomach staggers, I have also found the quantity increased, but not to so great a degree. These cavities communicate with each other by a canal situated behind a medullary arch termed *fornix;* on

* The pendant position of the head of the horse necessarily makes some difference between the relative situations of the human and brute brain; but the relative situation of each as regards the bones is the same. The veterinary student, in studying the description of the comparative anatomy of both, should keep this in mind, to prevent error.

removing which and laying open the ventricles, a vascular web or *plexus choroides* is seen, apparently destined to furnish the internal parts of the brain with blood, as the pia mater performs that office for the outer. As may be supposed, in all vascular excitements, local or general, this plexus is liable to be preternaturally suffused with blood; and in phrenitis it is often distended to turgescence. The lateral ventricles branch out into other cavities, called also ventricles, two remarkable ones of which are found in the tubular origins of the olfactory nerves. The *pituitary gland* is a spongy body of considerable magnitude in the horse, lodged between the sphenoidal folds of the dura mater in the centre of the cavernous sinus. The *pineal gland**, the *tubercula quadrigemini* of the cerebrum; and the *eminences, processus,* processes and other minor peculiarities of the cerebellum, may be gained by a reference to the description of the human brain; with which they correspond very intimately. In reference to which it may be remarked, that except the specialities already noticed, there is no organ of the horse's body wherein the anatomical similarity is so great to the human, as in the brain. The *cerebellum (b, fig.* 1, *Pl.* III), or *little brain,* is contained within the occipital bone, and rests upon the tentorium or transverse septum of the dura mater; and is, in the horse, placed superiorly and a little posteriorly to the cerebrum, with which it unites by its inferior part. It is not, however, so large, being as 1 to 7, and is divided into four lobes; which are an inferior, two lateral, and a superior. It is composed like the cerebrum of two substances, but which are somewhat differently disposed, giving to a longitudinal section of it the appearance of a tree, the medullary white part branching out from a body; whence it is called *arbor vitæ*. Externally the cerebellum is formed into numerous sulci, but it has no circumvolutions. The fourth ventricle, which in the horse is very considerable, is situated within this body, having its posterior surface upon the medulla oblongata, and its anterior being formed of the cerebellum.

The *medulla oblongata* (*a, b, c, fig.* 1, *Pl.* III) is formed by the reciprocal continuation of the medullary substances of the cerebrum and cerebellum, by two portions from each called its *crura*. Thus formed, it proceeds upward and backward to the edge of the foramen magnum in the occipital bone, to be continued under another name.

The immediate composition of the brain is little understood;

* This far-famed substance was long supposed to be the seat of the soul; but it was rather singular that this immaterial essence should have chosen the most mundane and degraded of the parts of the brain for a residence: for, from the adult period of the human subject, it almost always envelopes a quantity of earth; and which, it is curious, is almost confined to the human subject; having only in a few rare instances been met with in the goat and deer.—*De lapillis vel prope vel intra Glandulam Pinealem satis; Mogunt.* 1785.—*Encefalotomia d'alcum Quadrupedi, p.* 31.

but it is generally considered as fibrous, such a structure being apparent in some of its parts. It is not in itself an organ of great sensibility; on the contrary, some portions of it, as the cerebrum, are nearly insensible. Its diseases in the horse are principally confined to inflammation, which is either idiopathic, as in mad staggers; or symptomatic, as in the staggers of distended stomach: and to a morbid irritation of it, producing convulsion, as in tetanus. The chronic hydrocephalus, or slow collection of aqueous fluid within the cavities of the brain, and between its membranes, is not common in the horse. Sheep are frequently affected with hydatids on its exterior, and within the cerebral ventricles; particularly in the lateral ones.

The *medulla spinalis,* or *spinal marrow,* is a continuation of the medulla oblongata, which leaving the skull, enters the spinal canal invested by the membranes which covered the brain, which serve to sustain it; and as a farther support, a portion of the dura mater is given off to attach itself firmly to the edge of the foramen magnum. The spinal brain appears in every respect a true continuation of the substance of the cerebral brain; like that, it is fibrous, and presents two distinct columns and cortical and medullary portions. Its consistence is however firmer, which its division rendered necessary. Continued within the bodies of all the vertebræ, it is still further protected from injury. It has been ascertained to be hollow in the horse, ox, sheep, hog, and dog*. In its passage it gives between each vertebra a branch on either side, called the spinal nerve. The *blood vessels* of the brain and medulla spinalis we have before described in the Angiology, where it will be found that both are supplied by the carotids partially, and by the vertebrals principally, by which a large proportion of blood is carried to the head. The arteries enter the skull in a very convoluted manner; when anastomosing very freely, and giving some branches to the dura mater, they are continued on the pia mater; from whence their capillary branches enter the substance of the brain. The medulla spinalis is furnished by two branches called arteriæ spinales, given from the vertebrals, and some rami from the carotids. The blood is returned by the veins of the pia mater, which accompany all the circumvolutions of the brain, and, at length, pour the blood into the sinuses. Upon an inspection of the blood vessels of an injected brain, we shall easily observe that nature has taken a wonderful degree of care to prevent the effects of too rapid a circulation of the great quantity of blood sent to it; by which, as well as by the great length of the carotids, an apoplectic tendency is completely

* Mr. Sewell, of the Veterinary College, first gave publicity to this interesting fact.—*Phil. Trans.* 1800, *p.* 146. This medullary hollow originates in a sulcus of the brain called calamus scriptorius, and extends through the whole length of the spinal marrow to the cauda equina. It is present also in the human fœtus; and is in both furnished with a colourless fluid.

counteracted. It is likewise worthy of remark, that the whole of this important organ is guarded by a bony case, and as the vessels enter this case, they become also equally guarded; and that there might be no danger of the blood being obstructed before it arrives here, it is supplied by two sets of arteries; the principal of which pass up in such a manner as to be freed from even the chance of pressure; being encased as it were by the cervical vertebræ, and hence called vertebrals. In the veins there is a contrary speciality, because in them it was essentially necessary that they should be able to carry off the blood freely and regularly, seeing so great a quantity is sent to the head, and that the effects either of obstruction or rupture would be so serious: hence these veins have no valves, nor do they accompany the arteries; but are distinct and triangular, being formed of the strong firm coat of the dura mater, and having their sides still farther strengthened by transverse cords: these veins likewise have frequent inosculation, and like the arteries have two returning trunks to each side, one of which, the vertebral, is effectually guarded from pressure by its situation; and in the larger receiving trunks of the jugular, enlargements or sacs are formed in particular parts, particularly about the jaws, (see *Anatomy of the Head*) purposely to obviate the effects of accidental interruption.

The *nerves* are white fibrous cords, sent off either from the cranial or spinal brain, whose ramifications are distributed to all parts of the body. They appear, like their origins, to be composed of medullary filaments, enveloped in a firm membranous structure called neurilima, giving them a density and strength of consistence which their internal structure would not afford. Ten pairs of cerebral nerves pass out of the skull by appropriate openings in the cranial bones; and thirty-six spinal pairs are given off from the spinal marrow by appropriate vertebral foraminæ. (See *Osteology*.)

Cerebral nerves.—The first pair or *olfactory* nerves are very large and hollow, communicating by their cavities with the lateral ventricles of the brain*, in which they exhibit a great speciality from the human olfactory nerves. They appear to be formed of both the cortical and medullary portions of the brain, and take their origin from the anterior and inferior parts of the viscus, to be passed out of the cranium by the foraminæ in the cribriform portion of the ethmoid bone; after which they divide into numerous filamentary twigs, which, traversing the ethmoidal holes, are finally ramified in a reticular manner over

* In former days, when anatomy was principally studied from the bodies of brutes, this speciality led to a supposition that the hollow olfactory nerves were emunctories of the brain, by which the superfluous moisture passed off through the ethmoidal holes into the nose; and this gave rise to sternutatories or sneezing powders to clear the brain, which are now known to be useless.

the surface of the pituitary membrane, by which its exquisite sensibility of smell is furnished.

The *second pair*, or *optic*, arise in firm cords behind the former, from two eminences proper to them, called *thalami nervorum opticorum*. In their progress forwards they unite near the pituitary gland, where again separating, they leave the skull by their proper holes in the sphenoid bone, in company with the ocular artery, to enter the orbit, when penetrating the globe of the eye, they are expanded into the fine lamen called retina. (See *Anat. of the Eye*.)

The *third pair*, or *motores oculi*, are small branches which arise from the medulla oblongata near the sella turcica: they accompany a branch of the fifth pair out of the skull, and are distributed to the muscles of the eye.

The *pathetici*, or *fourth pair*, are likewise small nerves which take their origin from the cerebellum, near its junction with the cerebrum: they also accompany a branch of the fifth pair, and are principally spent in the oblique muscles of the eye.

The *trigemini*, or *fifth pair*, are very important nerves, and have very extensive communications. They rise from the annular processes of the cerebellum, and from the crus cerebelli*, and immediately form two principal divisions called maxillary, the anterior of which is afterwards subdivided, and which divisions correspond in some degree, but not wholly, to the supra orbital, superior maxillary, and inferior maxillary branches of the human fifth pair. The ophthalmic is the first division, and enters the orbit connected with the sixth pair to be divided into several rami; one of which furnishes the muscles of the forehead; another is given to the lachrymal gland, and two or three others to the parts within the orbit. The *anterior maxillary* branch of the fifth, first gives a ramus that, penetrating the palatine foramen, is distributed to the palate, furnishing also some nasal ramifications. The main trunk then entering the anterior maxillary canal, giving the molar teeth some ramifications in its passage, again comes out at the anterior maxillary foramen, and is finally distributed to the labial muscles.

The *posterior maxillary branch* emerges from the skull at the base of the petrous portion of the temporal bone; having given off a twig to unite with the intercostal, it divides into several ramifications, the first of which forms the *gustatory*, to be distributed to the surface and tip of the tongue, and may be considered as its medium of taste. The second branch passes by

* The fifth pair presents a ganglion immediately on its origin; and which it may be observed is a speciality; for no other cerebrine nerve does the same. It also forms, by a union of its anterior and posterior branches, a distinct plexus, evidently intended to unite in one common sympathy all the parts of the head.

the sigmoid groove of the posterior jaw; a third is ramified into the substance of the spheno maxillary, and digastric muscles. The fourth principal division furnishes the glosso pharyngeal to the tongue, the parts about the fauces, salivary glands, and molar muscles. The fifth division traverses along the internal surface of the posterior jaw, and enters the posterior maxillary canal, furnishing branches to the teeth: the remainder passes out at the foramen, at the symphysis of the skin, to be distributed to the muscles of the lower lips, and parts adjacent.

The *sixth*, or *abducent pair*, arises from the base of the annular processes, passes with the fifth pair, and enters the orbits to be given to the abductor muscles of the eye.

The *seventh pair*, or *auditory* nerves, arise from the lateral superior part of the medulla oblongata, each dividing into two portions: that called the *portio mollis*, enters the auditory foramen in a soft pulpy form, and is distributed to the internal ear. The *portio dura** has been called by Bell the respiratory nerve of the face. It comes out at the base of the petrous portion of the temporal bone in a firm cord, part of which is given to the parotid glands, and subjacent parts; but the most considerable ramus unites with a branch of the posterior maxillary nerve, giving a twig, which thus united forms the corda tympani, but which is usually considered to arise from the portio mollis. The main trunk then having first furnished the parotid gland, into which it dips, passes over the posterior jaw and divides, its branches diverging like the sticks of a fan, some of which are given to the muscles of the anterior jaw, but the principal to the posterior jaw.

The *par vagum*, or *eighth pair*, arises from near the base of the corpora olivaria, at the extremity of the medulla oblongata, in disgregated fibres, and, as its trunks emerge from the skull, they meet and receive each a nerve, formed from the spinal

* This nerve has lately gained much importance from the accurate dissections of Mr. Bell, who regards it more as an important agent in respiration than in fascial expression or locomotion. It has been heretofore considered, that the phrenic was the only respiratory nerve sent to the muscles: but late experiments have proved that in all the higher orders of quadrupeds who perform part of the act of respiration by muscles which run from the head to the chest, this nerve is invariably present; but that in those who do not respire by these agencies, as birds, &c., it does not exist. Mr. Bell has also discovered that it enjoys this property in common, not only with the phrenic, but with the spinal accessory, and also with a branch which runs from nearly the same roots as the phrenic, all which he calls respiratory nerves. In confirmation of this opinion, numerous experiments on horses and asses have shewn that a division of the portio dura of the seventh, or of the spinal accessory, or of the branch he names the external respiratory, paralyzes the muscles to which it goes as muscles of respiration, although it leaves the same muscles the power of acting on the head, through the agency of other nerves distributed to them for locomotion. (See Bell on the Nerves, pub. 1816). These facts are also detailed in the Phil. Transactions. The comparative anatomy of the portio dura in the elephant, the horse, and other animals, by Mr. Shaw, may be also seen in the Journal of Science for 1822.

marrow, termed *nervus accessorius;* and also branches from the fifth, from the lingual, the gustatory, and other nerves in its vicinity. Each par vagum, thus jointly formed, as it leaves the skull, either again parts from the nervus accessorius, or a branch is given off from the united trunks of the two nerves, which uniting with the intercostal, is distributed to the muscles and parts about the pharynx, larynx, and upper portions of the neck. The *eighth pair* then descend along the external side of the carotid arteries, and as they enter the chest they give off another branch, called the *recurrent*, from its peculiarity of returning and passing up the neck, by the side of the carotid artery, to be ramified into the larynx. From the circumstance that a division of the two completely paralyses the voice, the recurrents may be considered as the principal vocal media for the distribution of nervous influence to the laryngeal organs from whence sound is emitted. Both these nerves and the eighth have communications throughout their whole course with the intercostal, or great sympathetics, and these unions form different plexi, which will be described with the sympathetic nerve. After the recurrents have been given off, the par vagum are continued with the œsophagus, uniting with the sympathetic, to furnish the heart and lungs by means of the cardiac and pulmonic plexi. They furnish also rami to the œsophagus, but the great œsophageal plexus is not conspicuous in the horse as in the ruminants*. Having gained the stomach, they unite with branches from the sympathetics and spinals, to furnish that organ most plentifully by means of the corda ventriculi and other plexi. Branches are afterwards continued to form, in conjunction with the sympathetic, plexi to the remaining abdominal viscera†.

* As the œsophageal plexus is so conspicuous in man and the ruminants, it is reasonable to suppose that it is placed there to combine, in a peculiar manner, the action of the pharynx and stomach. And on the other hand, may not its absence in the horse and ass, in some measure, influence his inaptitude to vomit? See *Dissection of a Camel, Journal of Science*, 1822.

† The par vagum are so important to the economy of the horse, that a division of them instantly kills, while the division of one occasions little inconvenience. Their division in many other animals, as the dog, &c., is however not followed by immediate death. The par vagum have been supposed to be the principal agents in the secreting powers of the stomach; but as many animals in whom the digestive process is strong are denied them, this seems erroneous. It will be seen that they are very intimately connected with most of the cerebrine nerves, and also with the more important of the spinal ones also; by which extensive communication, some of the most curious phenomena which occur both in health and disease are readily understood. By these means, the larynx, pharynx, lungs, heart, and stomach, are united in one common sympathy and consentaneous action. In our experiments on animals, when life appears to have departed, by hanging or drowning; by irritating the heart by pricking, an attempt to respire is produced by this extensive sympathy: this also explains why, under such circumstances, inflating the lungs with pure air will again revive the suspended action of the heart. Disorders of the stomach, &c. derange the secretions of the larynx and pharynx.

The *ninth*, or *lingual pair*, takes its origin from the corpus pyramidali, and both pass through the condoloid foramen direct to the muscles of the tongue, and seem to be peculiarly appropriate to its locomotion, as the gustatory are to its functional property of taste.

The *tenth*, or *suboccipitals*, are a small pair, sometimes considered as a pair of the spinal nerves, at others reckoned as the tenth pair of the cerebrine. They arise from the extremity of the medulla oblongata, or beginning of the spinal marrow, and passing out by the occipital holes, are distributed to the muscles of the head and neck.

The *intercostals*, or *great sympathetics*, form a nervous pair of a peculiar kind, called *intercostal*, from situation; and *sympathetic*, from connexion and effects: for it is by means of this pair, that such extensive sympathetic effects are carried on between different parts of the body; but which are, however, more observable in the human than in the brute, though the anatomical distribution of both seems the same. Each intercostal nerve appears to be wholly compounded of other nerves commencing from those within the skull, as the fifth, sixth, and eighth, particularly. It passes out of the cranium by the foramen caroticum, and assists to form several important ganglia, in conjunction with the spinal nerves, with which it intimately connects itself; one of the first of which receives filaments from the ninth pair, and furnishes with rami the muscles of the larynx, pharynx, and neck. It is then continued into the muscles of the spine and the chest, forming, as it proceeds, extensive communications with the cervical and vertebral nerves: as it enters the chest it forms the cardial plexus, by which branches are sent to the heart, uniting with rami given off from the eighth pair. It likewise forms, conjointly with the eighth pair, and with some filaments from the dorsal nerves, first the anterior and then the posterior cervical ganglions, from which branches

and thus lampas follows a vitiated state of digestion; and thus nauseating remedies loosen the viscid secretions of the bronchia. It is in this manner that the apparent anomaly of coughing, as a symptom of worms, is readily explained; a disturbance of the alimentary canal operates in the aerial passages by means of the extensive communications of the pulmonic plexus. Through this plexus the actions of the heart and lungs are so much in unison, that to stimulate the one is to increase the action of the other; as heaving at the flanks alway accompanies increased circulation. Thus also nauseating the stomach lessens the action of the heart and arteries. Through the connections of the par vagum with the spinal nerves, by which latter the skin is furnished, this sympathy is extended to the skin also; and this solves the difficulty why so much common action is kept up between the stomach and exterior covering. Veterinary practitioners, by this consideration, will readily learn why hide-bound accompanies worms and indigestion, as well as chronic affections of the alimentary canal in general; and also why lampas, which is only a tumefaction of the cuticular lining of the mouth, should be more a symptom of deranged stomach than an original local affection. Under this view also, it is not difficult to understand why broken-winded horses feel the morbid sympathy of wishing to fill their stomachs with water.

are distributed to the thoracic viscera. After this, passing through the left foramen of the diaphragm, it forms, in company with the fifth pair, the coronary plexus, which as we have mentioned is distributed on the stomach, from whence it is continued through the abdomen, furnishing it, by its union with the dorsal and lumbar nerves, numerous ganglia and plexi, which are named according to the parts to which they are sent, as the *hepatic*, the *splenic*, the *great mesenteric*, the *renal*, and *posterior mesenteric*, and *spermatic;* by which it will be seen how extensive is the communication of this nerve, and from which extensive connexion we cease to be surprised at the common consent the parts thus furnished act with.

The Spinal Nerves.

The *spinal marrow, medulla spinalis,* or *spinal brain,* gives off the spinal nerves as it passes through the bodies of the vertebræ by an appropriate opening in each side of each of these bones (*see Skel.*); consequently the number of these pairs of spinal nerves corresponds with the vertebræ themselves, and their names are likewise similar. Hence there are *seven cervical, eighteen dorsal, six lumbar,* and *five sacral nerves,* whose principal use appears to serve for locomotion.

The *seven pairs of cervical nerves* communicate with each other in their whole course, arising each by little fillets from the distinct portions of the spinal marrow, which uniting, form a strong cord. These cords furnish the external and internal parts of the neck and withers; and from some of the first of them are given off rami, which, in conjunction with branches from the fifth and ninth, form the *phrenic nerve,* which entering the chest posteriorly is continued along the pericardium to be distributed to the diaphragm. From the second, third, or fourth of these, as it may happen, a branch is given off which unites with the portio dura of the face, and is then, as in the human, called *nervus communicans.* The more posterior of the cervical nerves in conjunction with two or three of the first dorsal, and with a branch from the intercostal, form a large ganglion, which gives eight or nine cords, forming the external and internal humeral, the axillary plexus, and the ulnar. The remaining cords are distributed to the muscles about the withers and shoulders, and plentifully to the panniculus carnosus and skin.

The *external humeral* passes down the inner part of the humerus till it is near the bottom of that bone, when it turns towards the outside of the arm, extending down the anterior and outer parts of the cubitus, to be ramified into the muscles of the leg and foot. The *internal humeral* (*vid. fig.* 2, *Plate* VII) proceeds with the blood vessels, over the inner condyle of the humerus, when it takes the name of *radial,* and passes in company with the vessels behind the knee, and under the flexor tendons of the foot, upon the suspensory bifurcating ligaments, still continuing with the artery and veins, giving branches in its passage to the surrounding parts, and in this course receiving the name of *metacarpal:* it at length divides with the artery and vein into the *pastern,* or *lateral nerves,* in the same manner with those vessels, and is finally ramified into the foot. The *ulnar* passes over the olecranon on the inner side, to be distributed to the flexors of the canon and foot, running down with a branch of a vein distributed in the same manner.

The *eighteen dorsal pairs* are given off by the notches at the extremity of each dorsal vertebra. They pass between the ribs, and communicate freely with each other in their passage, whereby respiration is promoted. By the first and second trunks, branches are given off to assist in forming the nerves of the fore extremities; throughout they have an extensive communication with the intercostal. In their passage they detach filaments that furnish the panniculus carnosus, and muscles of the back; and likewise send some inwardly to be spread on the inferior layer of intercostal muscles: they finally lose themselves in the surrounding parts, those most posteriorly furnishing the abdominal muscles.

The *lumbar nerves* are given off in the same manner as the former, which all communicate with each other, and with the intercostal; by which they assist in furnishing the viscera of these parts and of the pelvis. The first of these, communicating with the last dorsal, sends branches to the muscles of the back, and internally to the abdominal, to the psoas, and to the iliac muscles. The third, fourth, fifth, and sixth, unite to form, in common with a branch of the intercostal, the *crural nerve,* which escapes out of the abdomen with the vessels, below the crural arch. There is likewise a branch formed, which may be called the *posterior crural,* or *obturator,* passing out of the obturator hole, and furnishing the obturator, and other muscles near the great trochanter.

The *crural nerve* gives branches in its passage to the inguinal glands, the adductors of the femur, and continuing down is principally distributed to the muscles, and parts in front of the thigh: a twig is, however, sent down superficially on the inner side of the leg.

The *sciatic nerve* which is formed from the last lumbar, and the first three or four sacral pairs, is a very considerable trunk; it is found passing along the internal part of the ilium, and between the two layers of the sacro-sciatic ligament. Within the pelvis it gives some branches; and as it passes out, it furnishes likewise the muscles of the thigh and scrotum: after gaining the posterior part of the thigh, it sends off two considerable rami, one of which is divided into the massy muscles of the buttock; the other carries itself forward to the front of the tibia.

The *popliteal*, is the continuation of the sciatic, and runs between the two heads of the gemini, accompanying the posterior tibial artery and vein, and is seen in this course (*vide* 4, *Fig.* 1, *Plate of the Extremities*), passing with the same artery and vein in the groove of the calcaneum, accompanying the metacarpal vessels receiving the same name with these vessels, and also bifurcating in the same manner with them into the two *pastern nerves*, which ramify in a similar way with those of the fore extremities.

The *sacral nerves* are in pairs, correspondent to the number of the pieces of the false vertebræ of which the sacrum is composed, and are given out by the holes in its sides. They communicate likewise with the intercostal; and the first three or four pair assist to form the sciatic nerve on each side. The remainder, as well as some filaments of the former, are distributed to the rectum, anus, bladder, and parts of generation in either sex. The penis is furnished by a considerable branch from them in common with one arising from the hypogastric plexus. The *remainder of the spinal marrow* is given out at the extremity of the sacrum, and runs down the tail in two or three small branches.

The *structure* of the nerves, like their origins, is fibrous; and when divested of their membranous investure, is but slightly elastic. Nerves are furnished with blood vessels which ramify on their surface, but which do not appear to suffer the red parts of the blood to enter. Like the important blood vessels, their principal trunks pass to their destinations deeply seated, and often in company with them, particularly in the extremities. In their passage they branch off at acute angles, and finally ramify by sentient extremities of such minuteness, as to be invisible to the eye. The nervous divisions frequently unite again, and produce a small medullary enlargement called a *ganglion;* and which ganglia, as being more general among the nerves, distributed to parts possessed of involuntary motion, are now very generally regarded as auxiliaries to the brain, and as peculiarly connected with cerebral capacity*. Both the transit and the distribution of the nerves differ under different circumstances; sometimes they proceed to their destination in direct lines and in single trunks, as the optic and olfactory: more frequently however they communicate and interlace with each other, and, where such junctions are particularly close and numerous, they form a *plexus*. In their distribution,

* Lancissi, an antient Italian author, by accurately examining the ganglia in the horse, and comparing their phenomena, was led to suppose them to be little brains or substitutes for that organ, and this presumption gains strength by our further acquaintance with comparative anatomy. In the lower orders of animals deprived of brain, their nervous structure appears to derive its energy from the ganglia alone, which in them are numerous and very regularly and plentifully distributed.

some parts are found to be much more plentifully supplied than others. The organs of sense, the muscles, and the skin, are peculiarly so. Some interesting but inexplicable phenomena in the animal body have occasioned it to be supposed that, in their cerebral origin, the nerves *decussate;* or that those of one side of the body arise from the opposed side of the brain. The living powers of the nerves to support themselves must be considerable, from the now fully established fact that they are capable of reproduction*. The simple division of a nerve destroys for a time only the nervous powers of the ramifying branches beyond its division. It is found that the divided extremities first become enlarged, and more vascular and coagulable lymph, which soon becomes organized, is interposed between them. The subsequent cicatrization draws the divided ends nearer together, and the nervous, as well as the living principle, is continued through the interposed substance; which assimilates nearly, but not entirely, to the structure of the original trunk. This is proved to be invariably the case in the nerves formed for sensation: but at present we are not aware that similar phenomena can be made to follow the division of the nerves of voluntary motion. (*See Neurotomy.*)

The *diseases* of the nerves are few, and those principally dependant on a morbid excitement of the irritability natural and proper to them, producing convulsions and spasm. Tetanus is the most prominent instance we have of this, and thus pressure on the brain has been found for a short time to relieve it. An inflamed surface is exquisitely tender, from some alteration in the irritability of the nerves; and probably stringhalt depends on local nervous irritation. Gutta serena is an instance of paralysis in the optic nerve: general paralysis, as an idiopathic affection, is little known in the horse.

The *physiology of the brain and nerves,* important as it is, is yet involved in an impenetrable mystery. We however know enough to be assured that the brain is the organ of consciousness; and that in proportion to cerebral developement, are the number and kind of intellectual phenomena in different animals†. The nerves are less active, and appear to be the media

* It is but due to departed genius, to promulgate that this important fact, if it did not immediately originate with the late ingenious Dr. Haighton, yet was first established by him in 1792, at which time I assisted him in numerous experiments on this subject; the results of which, with drawings made by me explanatory of the appearances of the re-united parts, were presented to the Royal Society the following year.

† As a general conclusion, we may assume that where the rational principle is strong, and the organs of sense comparatively weak, as in man, that the volume of brain does greatly preponderate to the general mass of nervous matter. On the contrary, in brutes, where the organs of sense are more depended on than the rational principles, the nerves are in the greater proportion. It had not escaped the observation of Pliny and Aristotle, that the brain of man is proportionally larger than that of any animal, the elephant excepted.

or messengers by which nervous influence in the phenomena of sensation and volition are transmitted to all parts of the body, and by them excitements to motions are propagated. The nerves also convey impressions back again to the brain; thus the horse smells with his nose, and feels with his lips; and through the medium of the nerves of both, his intellectual powers resident in the brain take cognizance of the matters examined. To the organs of voluntary motion, the excitement along the nerves is dependent on the will; to the involuntary it is dependent on necessity or sympathy, connected with the wants of the animal. If the brain be injured, locomotion is destroyed wholly or partially, in proportion to the degree of cerebral derangement. From some wise provisions, perhaps from a power resident within the ganglions *per se*, the functions of the involuntary motions go on when the voluntary are stopped; as we see in animals partially stunned, and in apoplexy where breathing and even digestion are carried on while the limbs are motionless. Pressure on the brain produces the same phenomena as laceration of certain parts of it. The tænia of the sheep gradually destroy life by this means; and concussion, by lacerating the medullary fibres, produces similar symptoms, but more immediately. When the brain is diseased or compressed, the whole body suffers, and becomes convulsed or paralysed: but if the spinal marrow be thus circumstanced, then only those parts whose nerves are given off posteriorly to the seat of injury become affected. When the brain is compressed or injured on one side only, leaving the other wholly unaffected, it has usually been found that the morbid consequences appeared on the opposite side. On the contrary, when one column only of the spinal marrow is divided, the paralytic affection has appeared on the same side, which is still equally accounted for by a decussation of the cerebral fibres, as noticed in the anatomy of the brain. Each nerve is the messenger of the power delegated to it by the brain; thus the division of a nervous trunk paralyzes an organ of voluntary motion, but leaves the surrounding parts unaffected. The nerves are acted

This led to the formation of a scale of weight of the brain compared with the general mass; and the ratio of intellect in several tribes were deduced therefrom: but a more extended experience proved this to be fallacious; for, according to this theorem, the dolphin, the seal, some quadrumana, &c., would excel man in his greatest attributes. Subsequent writers, among whom Soemmering stands conspicuous, draw another comparison; that of the ratio which the volume of brain bears to the bulk of the nerves arising from it; and in this mode it will be found invariable, as far as inquiries have been hitherto prosecuted, that in proportion as the cerebral or more noble part preponderates, the powers of mind will be seen more extended and diversified; and by this mode of comparison, man is without any competitor. The simia, elephant, dog, and other animals, follow, and bear an exact proportion in the order of their intelligence, which confirms the justness of the principle.

on by what we call stimuli, which seem general, appropriate, and unnatural or diseased. Mental excitements, full health, generous food, &c. excite the brain, which gives its excitement to the nerves, and various phenomena are produced*. Some nerves are insensible but to an appropriate stimulus, as light stimulates the retina, but the finest sounds fail to move it; and thus hearing is operated by the nerves of the ears only. Stimuli, unnatural or diseased, are extremely numerous, and produce phenomena as varied as their numbers.

A modification of ordinary stimuli is found in what we understand by sympathy; in which also various phenomena present themselves, usually dependent on the free communication of very different nerves with each other: and this order of communication is not arbitrary, but varies in almost every subject; and thus the sympathies thereby excited appear hardly alike in any two subjects. In man this is peculiarly observable; the stomach will sympathize with the eyes, and a disagreeable sight will occasion vomiting; cold applied over some parts of the body stimulates the bladder to empty itself. Habit excites sympathies; thus whistling tempts the horse to stale when he has been accustomed to the solicitation. Some very important and ingenious experiments, lately made by Mr. Brodie, would seem to extend this sympathetic communication from the nervous to the sanguiferous system, in the production of animal heat; thus tending to subvert the former opinion, that animal heat depends on the chemical change which the blood undergoes in the round of circulation, and is received by means of nervous influence; for we learn by his experiments, that he invariably found, by destroying the communication between the brain and lungs, the heat of the body disappeared, although respiration was kept up by artificial means, and the other ordinary changes of the blood appeared the same. (*See Respiration.*) It remains only to add, that, if I have extended this subject beyond the limits of the former editions, it has been from a conviction of its importance to the medical student, both in a theoretic and practical point of view. To a more accurate knowledge of the structure, anatomical arrangement, and functions of the nerves, we are indebted for some of the greatest improvements the healing art in general has lately received; and in which the veterinary department acknowledges at least an equal share, of which Neurotomy forms a prominent instance.

* Extraordinary excitement will produce extraordinary phenomena, and we thus know how to account for the wonderful power exerted by the muscles when under the action of morbid nervous excitement in convulsions, and likewise when mentally stimulated by fear, passion, &c.

Section XIV.

ADENOLOGY.

GLANDS are vascular secretory bodies distributed over every part of the animal frame. They are of various sizes, some being very large, as the liver, and others small, as the cryptæ. Their *figure* is as varied, and their *situation* undetermined; some being deep-seated, or within cavities, while others are altogether superficial. The office of secretion does not appear proper to all such parts as we consider as glandular, as is instanced in the thyroid, which, as far as we know, does not secrete; other parts again secrete, that appear to have no glandular structure, as the capsular ligaments. Glands may be divided into *folliculose, globate, glomerate,* and *conglomerate;* they also likewise receive individual names, according to their office, as *lachrymal, salivary,* &c. The *follicular* are small glandular bodies variously disposed, and appear either *sebaceous* or *muciparous.* The *sebaceous* are mostly situated on or near the surface of the body, and appear composed of small arterial convolutions, by which a substance is formed, having some degree of solidity, and resembling suet, hence called sebaceous. *Muciparous glands* are described as small follicular bodies, usually situated in cavities and canals; secreting a mucus; as that of the nostrils, fauces, and urethra: but in many instances they are not very evident, and in some mucous membranes their existence even is doubtful. *Globate glands* are oval vascular bodies, receiving lymphatic vessels at one side, and permitting their exit at the other, but are destitute of any other excretory trunk; hence they are deemed peculiar to the lymphatic system. A *glomerate gland* appears one connected body, of an indefinite shape, with an excretory duct; as the kidney, liver, &c. A *conglomerate gland* is a body composed of several glomerate glands, or lobuli, each of which has its proper excretory duct, which unite to form one trunk common to the whole, whereby the gland is connected, as well as by the cellular membrane; such are the salivary and pancreas. There does not seem to be any essential difference in the economy or functions of the glomerate or conglomerate glands; the convenience of situation appears to be studied more than any varieties in their office; hence, early in life, some are conglomerate which in the adult become glomerate. The glands of young subjects are said to be larger than those of older; and from the alteration which takes place in the kidney and thymus gland, we see that some change really takes place both in their size and figure during life. The nerves of glands are small, but enter with the blood vessels; thus their sensibility is not considerable. Their arteries are however large, and numerous, and particularly so when the office of secretion is considerable, as in the kidneys, where they are very large. The blood is returned by venous trunks. In its passage through glandular bodies, the blood is found to be retarded in its course through glands by means of the structure and situation of their vessels: their arteries are usually convoluted, and have a greater proportion of muscular than elastic coat, and their veins are without valves; by which formation, the blood remains a longer time within the gland, and can be more completely acted upon. All the secreting glands perform their secretion from arterial blood, but the liver, which separates its fluid from venous blood. Glands are also furnished with absorbents: in the liver and spleen they are observed to be particularly numerous. Among the phenomena that these bodies present, a sympathetic property is a marked one. The sight of food stimulates the salivary glands, and which is particularly observable in the carnivora; thus a dog will slaver abundantly while his meat is cutting for him. The sympathy of the kidneys with the skin is very considerable, and, when either becomes greatly excited, the secretion of the other diminishes. In summer, when the skin is in full action, and the blood pours out its aqueous particles in sweat in great plenty, little urine is made; but in winter the reverse takes place. As the circulation through a gland is increased, so is the secretion enlarged likewise; hence under the first stages of inflammation, glands secrete more, because the circulation is quickened; but in the latter stages of inflammation, or when it exists in a great degree, the secretion is lessened, or totally stopped: for then the gland probably becomes, in a measure, disorganized, and unfitted for its functions. The individual glands will be described with the parts to which they more immediately belong.

The *physiology of secretion* is but little known. That from one liquid (the blood) fluids so different as the urine, semen, bile, &c. should be formed, cannot fail to excite our wonder and stimulate our inquiries. Glandular secretion has been supposed to depend on the previous existence of the secreted matter within the blood, and that the glands only strained, or otherwise separated these component particles. But the blood, it has been answered, possesses the same chemical properties throughout the body; and that, drawn from whatever secreting organ it may, it is still the same. Nevertheless the elementary principles of all these may exist in the blood in a latent state; and it does appear to be a living act of the glands themselves, to separate and compound each proper secretion from it: we can therefore arbitrarily alter many of the secretions both in quality and quantity, by local excitements. This opinion is farther proved by some of the phenomena of vegetation. The sap of trees owns the same chemical properties, yet forms, by the medium through which it passes, either wood, bark, leaves, blossoms, or fruits.

The *diseases* of the glands in the horse are fewer than those of the human glandular parts. Scrofulous and cancerous affections are nearly unknown in veterinary pathology. Their secretion can however become morbidly excited, not only as to quantity, but as to quality also; as we witness in diabetes. Urinary calculi arise from a deranged secretion also, or from morbid separation of earthy matter from the blood. The liver, the spleen, and the pancreas of the horse, have all of them been occasionally found diseased and much altered in structure.

Sect. XV.

SPLANCHNOLOGY.

HAVING treated of the structure and composition of the parts of the body generally, we come now to describe the organs themselves individually: which we shall do by considering the horse as composed of head, neck, chest, abdomen, pelvis, and extremities. All these parts are invested by some general coverings, which must be first noticed.

The Common Coverings and Integuments.

Under the name of skin, are exterior parts kindly bestowed on animals to regulate their form, to protect them from injury, and to modify the action of the surrounding elements. These components are the cuticle, or insensible skin, the rete mucosum, and the cutis corium, or sensible skin: connected with these, are the adipose and cellular membranes, and the panniculus carnosus. The hairs and hoofs are considered as appendages to the skin; the former of which, as being most exterior and almost universal, we shall first notice; the latter will be described with the extremities.

The *hair*.—Each hair is a little tube, whose bulbous end arises within the cellular web, immediately attached to the cutis, or true skin*, penetrating that, the mucus web, and the cuticle, and appearing exteriorly of indeterminate lengths, figures†, and sizes. Thus those of the mane and tail are large and long; those above the eyes and around the muzzle are

* In some animals the hairs appear to be merely filamentous elongations of the cuticle, and are subjected to its various changes, as is seen in caterpillars, whose hairs are cast with their cuticle or outer skin.

† Some hairs are thickest in the middle, and in some animals they are seen flat; in the whiskers of the seal their margins are waved. In the porcupine and hedge-hog they become spines; in swine, bristles; and when crisped, they form wool: but in all, hair forms one of the most permanent animal substances with which we are acquainted, resisting putrefaction very long.

strong, but of diminished length; while those which extend over the body generally are comparatively very short and fine. Each hairy tube is formed of an external horny covering, and a central vascular part, termed its medulla or pith. The horny portion is filamentous, and so disposed as to form each hair into an elongated cone with protruded processes, giving the hair the property of receding in the direction of its roots when subjected to pressure, and on which the process of *felting* depends. The colour of the hair varies much in different subjects, and in different parts of the same subject, and which variations appear in a considerable degree to depend on the colour of the mucus web, which is exemplified by spotted or pie-bald horses, in which the colour of the skin varies with that of the hair. Its colour is also influenced by climate, but less in horses than most other animals; for as the horse is naturally a native of climes not frigid, so there was less necessity that he should vary to the tropical hues. As certain colours of hair are supposed to arise from certain general structural arrangements, so colour has been considered as the criteria of mental and personal qualities (*see Exterior Conformation*): and there appears to be reason for this supposition; for many facts prove to us that a dark tint usually accompanies strength and durability *, as the contrary accompanies weakness and irritability. Age, which produces debility, is accompanied by a change in the colour of the hair, from a darker to a lighter tint; and the hair which arises after a wound is usually white, and this whether the mucus web has been destroyed or not; which cannot be accounted for but by considering the part to be in a state of debility. It is likewise remarked that white extremities are found more disposed to the affections of cracks, grease, &c. than others. The inclined position of the hair admirably adapts it to the purposes of protection for which it was designed †. This position sometimes becomes disturbed, partly by a derangement in the vascular bulb of the hair from whence the unctuous matter is derived, which tends to make the sleek glossy coat of the healthy horse so beautiful; and in a greater degree from a derangement in the skin itself, originating in a sympathetic

* It is found that black hair usually is accompanied by a very thick skin, and it is remarkable that few thorough-bred horses are black. There is also a general connexion between the colour of parts and that of the hair. The eyes, hair, and skin, are usually of the same tint: milk white horses are thus often wall-eyed.

† Parts subjected to much disturbance by motion, as the bendings of the extremities, throat, flank, &c. have the hair irregularly placed and wavy. It is also equally irregular in its distribution, being on the exposed portions of the body very dense, but under the belly, the entrance to cavities, and around the lips, nose, &c., very soft and fine. A singular variety of African horse is entirely without hair. Mr. Sewell saw a stuffed preparation of such a one at Berlin.

communication with the alimentary canal, which in a staring coat and binding of the hide is almost always present (*see Hide-bound*). In the cold fit of fever, or under the action of accidental cold, the coat will also stare by the corrugating action of the panniculus carnosus. The hair is kindly allowed to sympathize with the wants of the body generally, and thus it is given thick and curled in cold climates, as is witnessed in the Shetland breeds. It also alters its quantity and quality, by this sympathy to the varied temperature of climates alternately hot and cold. In the Orkneys, the horses have long coats all the year, and English horses taken there keep likewise a long coat through the northern year. But with us, as that portion of the hair called the coat is deciduous, and falls off; (that on the mane, tail, and fetlocks, is permanent) so the animal is seen to present the phenomena of a fine short coat in the spring, which has succeeded to the winter covering. As autumn approaches, this also falls, and gives place to a longer, thicker, and warmer expansion. That this is a sympathetic effect between the skin and constitution, is evident from what takes place in horses who are artificially kept; that is, in those who are constantly immured in hot stables. For in them, as the change of temperature between winter and summer is hardly perceptible, from the additional heat that is usually given the stables at this time; so the constitution not wanting any increase to the covering, the summer coat either remains, or, if it be changed, it is for one with the same length of hair; and it has been to prevent the change of this summer coat, or rather to encourage the production of one of similar length, that has led to the custom of stabling horses with the degree of heat usually met with where the owners pride themselves upon the beauty and sleekness of their horses' appearance. Not only do hot stables tend to prevent a long coat from forming, and thus to perpetuate a short one, but most stimulating substances likewise have the same effect; from which it appears probable that any thing which increases the circulation, has a similar tendency to produce it: hence likewise horses, after strong exercise, shed much hair, which is an act of the skin to prepare for a future production; and aware of this, idle grooms give their horses spice, and other stimulating substances, to promote the shedding of their long coat. In most cases the general covering of hair is truly deciduous, and sheds each spring and autumn, and which change takes place rapidly; but even at all other times the hair appears subject to the same change with other parts of the body; and, it is probable, that few individual hairs remain from the vernal to the autumnal, or from the autumnal to the vernal period. The general growth of hair appears a process that requires considerable powers of the constitution; hence horses, at the time of moulting, are usually weak, and, during that time, their pulse is slightly increased*. As the hair appears to be a production of the true skin and the cellular web, so, if by any means they become wholly destroyed, the hair is not re-produced; thus in blisters, when properly applied, the cuticle only is raised; but the rete mucosum and cutis remain entire: if the stimulating application be strong, the rete mucosum is raised likewise, yet the hair is not affected; but if the blistering matter act very strongly, and the cutis be destroyed, a baldness ever after is the consequence.

The Cuticle.

Immediately under the hair is a firm insensible covering to the true skin, called *cuticle,* or *epidermis.* The substance of the cuticle is by no means equally thick in every part: on some its substance is considerable, as on the back and extremities; and on others it is very thin, as over the lips, &c. It appears, as in the human, to be much increased by pressure; hence I have found it of astonishing thickness on the rumps of asses, who are much exposed to be beaten on that part. Over the knees, the points of the elbows, and hocks, it becomes likewise much increased from pressure, and it is also originally given thick to these parts. Within the fore arm, and on the inner side of the canon behind, it produces a substance not unlike horn, which grows to a considerable length, and is then removed in scales and re-produced. The colour of the cuticle is the same in every horse, let his tints or markings be what they may; and the apparent diversities of tone it presents, are wholly dependent on the parts underneath. The cuticle adheres to the cutis or true skin, by means of numerous papillæ, which run from the cutis into its substance. These papillæ are thought to be the expansion of the nerves of the skin, the exquisite sensibility of which is modified through the medium of this substance. The cuticle may be separated by maceration and boiling in the dead subject; in the living, by fric-

* Animals who lick themselves are subject to have collections of hair, in the form of balls, within their stomachs; sometimes these collections have increased to such an extent, especially in oxen, as to incommode, and even to kill; they are said to be particularly frequent in the chamois goat, called *Ægagropilus;* and in times of superstition and ignorance these particularly were used in medicine as a species of bezoar. The collections of concrete matter found within abdominal cavities, have also been frequently mistaken for hair balls: such appears to have occurred with a man much troubled with colic, whose case Sir Hans Sloane gives in the Philosophical Transactions; where a substance, six inches in diameter, was found in the intestines, which, when viewed with a microscope, appeared made up of hair like the *tophus bovinus;* but which was only the appearance the concrete had assumed, and which had a plum-stone for a nucleus. Some hair balls are covered with a thin smooth coat or shell, of which kind I have a beautiful specimen, correctly spherical, extracted from the stomach of a camel: others are naked, and shew the hairs on their surface, being simply connected together by gluten. Horses are but little subject to these hair balls, though now and then they do exist in them also.

tions and stimulants, as cantharides. It covers the skin throughout its whole extent, except at the hoofs; and these, it is probable, are only a species of cuticle, or a secretion from the cutis*. It lines likewise many of the large openings made through the skin by the entrance of canals, as the mouth, where the cuticular lining is continued into the œsophagus, and over the first portion of the stomach. The cuticle is perforated by the sebaceous ducts, by the exhalent vessels, and by the absorbents. Through the exhalent orifices, the insensible perspiration passes off; and through the sebaceous ducts, which are evident to the naked eye, the cuticle is furnished with an unctuous substance which keeps it soft and pliant, and which gives it that greasy feel we are accustomed to. Blisters applied, irritate and inflame the true skin, and occasion so great a deposit of serum underneath, that the cuticle is forced up, and then it no longer remains pervious, and hence an accumulation of water takes place underneath; there is, however, in the horse seldom so complete a separation between the cuticle and cutis as takes place in the human blister, but the cuticle becomes partially raised into small bladders. The insensible skin appears formed from a real secretion of the true skin, and is almost endless in its re-production, forming in a very short time after its removal from a healthy surface.

The *corpus mucosum*, or *rete mucosum*, is a mucilaginous substance placed between the layers of the cuticle and cutis, the structure and uses of which have not yet been satisfactorily explained. It is the origin of the colour of the skin of the body, as is readily demonstrable by taking either the outer or the inner skin separately, which exhibit the same hue in horses of every variety of tint. It is found to be difficult of reproduction, and has been said to be never regenerated.

The *corium, dermis*, or *true skin*, is a very general membrane, obviously most highly organized, whether as regards its vascularity, sensibility, or the intimate reticulation of its fibres. Its density of structure will be readily apparent when we consider that it is the part which forms leather. It is not equally thick in every part of the body; but is kindly given, like the cuticle, thickest where the parts are most exposed. In the extremities it has great substance, particularly over the fetlocks, the knees, hocks, &c. as well as over the back, belly, and some parts of the head: it is also much more loose and flexible in some parts than in others, to admit of motion. It is connected exteriorly to the rete mucosum and cuticle, and interiorly to the fleshy pannicle and membrana adiposa; and wherever it is so connected it is more loose: in some parts it is even corrugated, as behind the fore legs. Its outer surface is garnished with numerous papillæ, which are small eminences extremely sensible, lying under the cuticle, and

* Insensible as is the cuticle, it is convertible or is modified into the diversities of scales, nails, shells, plates, and hoofs.

received into its depressions; and wherever the skin is most sensible, these papillæ are found most numerous and extensive. The true skin, like the cuticle, is perforated by numerous openings, which are the exhalent and inhalent orifices; and by the ducts of small sebaceous glands, situated immediately under the skin, in its adipose membrane. These openings appear in greater plenty in some parts than in others; as in the nose, ears, and parts of generation, which are full of them. These ceruminous openings furnish an unctuous matter which is particularly abundant in those parts subjected to friction*. The cutis is elastic, as we know by the effects of pregnancy, in which it becomes greatly extended, yet soon recovers its former dimensions. The blood vessels, nerves, and absorbents of the cutis, are as abundant as its highly organized structure would presuppose.

Sense of Touch.

A very principal intention of the skin appears to be, that of becoming a medium through which objects are distinguished, by an application of the surface of the parts to them: by this extended medium, heat and cold, dryness and moisture, weight, and every other sensation capable of being received, are recognized: and by some particular parts, as the muzzle, or extremities of the lips, and by the toes, quadrupeds attempt to distinguish objects from each other particularly; in which parts it is observed, that the cutaneous nerves are more numerous, and the cuticle thinner. The irritability of the skin is frequently very great: that mixed sensation between pain and pleasure called tickling, is a peculiar nervous irritability of the skin, and is very distressing to some horses while under friction.

Adipose Membrane and Fat.

The *adipose membrane* is a very considerable part of the body of most animals; but like the panniculus carnosus it cannot be regarded as a complete covering or investment, since many parts are without it, as the eyelids, ears, sheath, some parts of the extremities, &c. It appears composed of a number of membranous laminæ, so disposed as to form themselves into cells, neither the number nor the size of which are the same in all parts of the body. In the mesentery, omentum, and about the kidneys, they are large and numerous, and in these parts there appears a disposition in the contained substance to become of a firmer consistence: on the surface of the body, these cells are smaller, and in the bones, where their contents are nearly fluid, they are very small. The adipose cells do not ap-

* The mallenders and sellenders appear to arise from a diseased increase or alteration of the sebaceous glands within the bendings of the knee and hock; and as these follicular openings are very numerous in the heels, so cracks, scabs, and grease are referrible to the same cause.

pear to communicate, or the fat would gravitate; and this forms a very essential difference between the adipose, and the general connecting cellular membrane in which the cavities communicate. It is vascular, and has nerves and absorbents, and is likewise subject to the diseases attendant on vascularity, as inflammation and abscess.

The *fat* is an unctuous juice that is poured into the different cells of this adipose membrane, at first in a fluid form; from which it gradually becomes of a firmer consistence. It appears in greater quantity in some parts of the body than in others, forming in the abdomen suet or lard, while that over the surface of the body, and within the bones, continues always more or less fluid. Different animals have their adeps of different degrees of firmness, from the firm suet of the ox, and the tallow of mutton, to the soft lard of the hog and that of the horse, which is of a mixed degree of consistence.

The *uses of this substance* appear to be several: it may be considered as a guard to parts; and its distribution strengthens this opinion: hence it is found covering the nerves and blood vessels, especially such as are in the neighbourhood of hard parts, and liable to pressure. It fills up most interstices, and thus adds much to beaty: this is instanced in the eye-pits, which in young horses are filled up with this substance. A second use is, that of lessening the irritability of the cutaneous nerves, which in young animals are very plentiful on the surface, and very irritable; we, therefore, find most of the adeps in early life distributed exteriorly, while that of older subjects is placed mostly within the cavities of the body. In quadrupeds of all ages, the omentum is very plentifully supplied with it, but in some more than in others; the quantity in the horse is proportionally small. The kidneys of most quadrupeds are surrounded by it; in some they are completely imbedded within it; and throughout the whole abdomen it is found in considerable plenty, though less in the horse, as an animal destined for speed, than in some others. In all quadrupeds it fills up the interstices of the muscles, and is placed in the cancelli of bones, where it is termed *marrow*. The most important of the uses of the fat of animals, is to form a depôt for the support of the constitution under the accidental want of nourishment: hence much fatigue produces a rapid absorption of it. It is from this cause that animals who fast long, from the highest state of obesity, become wholly lean and impoverished; and thus the hybernating bear, who enters his wintry habitation surrounded with an immense quantity of adeps, leaves it in the spring greatly emaciated, having been supported during his torpidity by the absorption of this large portion of animal oil, and not, as is vulgarly supposed, by sucking his paws, which are only wrapped around his nose, but never enter his mouth. Animals living a life of rest, appear to have a tendency to form this fluid, but not in an equal degree; for, in addition to inaction, there must be a particular disposition of the constitution, favourable to its production. In the brute, a particular form of the body is best adapted to the formation of fat; thus round carcases, arising from circular ribs, are favourable to it, by producing a large surface for the absorption of chyle. A superabundant quantity of food beyond the waste of the constitution is converted into this oil: hence full fed animals become fat.

Cellular Membrane.

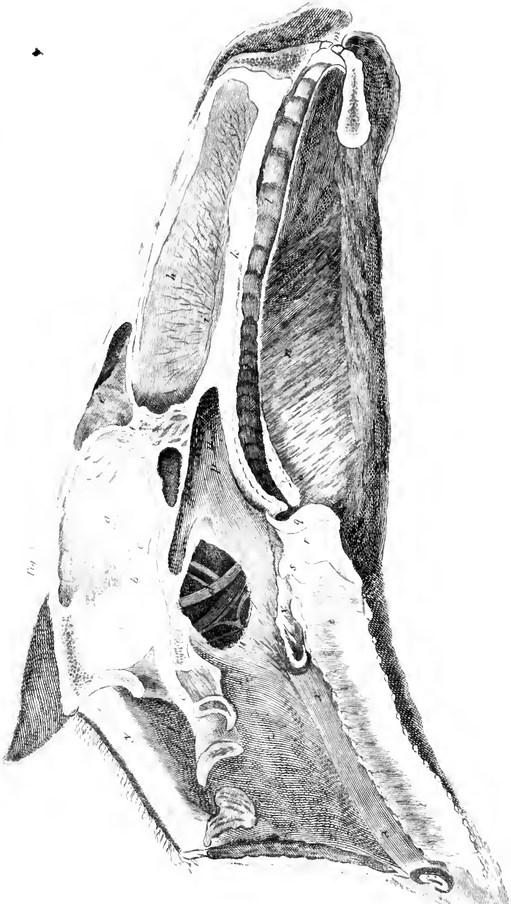
This, and the former, are probably but modifications of each other, and together they form the innermost layer of the integumental coverings; being situated in almost every part of the body. Like the adipose expansion, it is formed of membranous cells, but which freely communicate with each other throughout the whole body; as we see from the nauseous practice of butchers, who blow up the newly killed calf from one point, till not only the surface, but even the viscera, become distended by the air. This structure is exemplified, likewise, by what occurs after a wound in the lungs, when a similar swelling and distention takes place of the whole body, which is called *emphysema:* and likewise from wounds of the hock and ulna, from which latter facts we likewise find that these cells have a disposition to absorb air. Cellular membrane is, perhaps, a more general substance than is supposed; for it appears probable, that even ligaments are but a modification of it, with, perhaps, a peculiar arrangement of fibres; nor are aponeuroses, or tendons, very dissimilar. It exists in different quantities, and in various forms in different parts: in some it is strong and dense, taking on the appearance of ligaments; in others, it consists of the finest laminæ. It is the connecting medium between the skin and the body; it enters into the interstices of muscles, connecting their fibres; it is likewise interposed between the various expansions, of which parts are made up; it connects all the filamentary substances, and holds together the granulated: it is also vascular and elastic, and is the immediate seat of abscess. Anasarca has its seat within its cells; and it is probable that to some alteration in its structure we may often attribute what is termed hidebound.

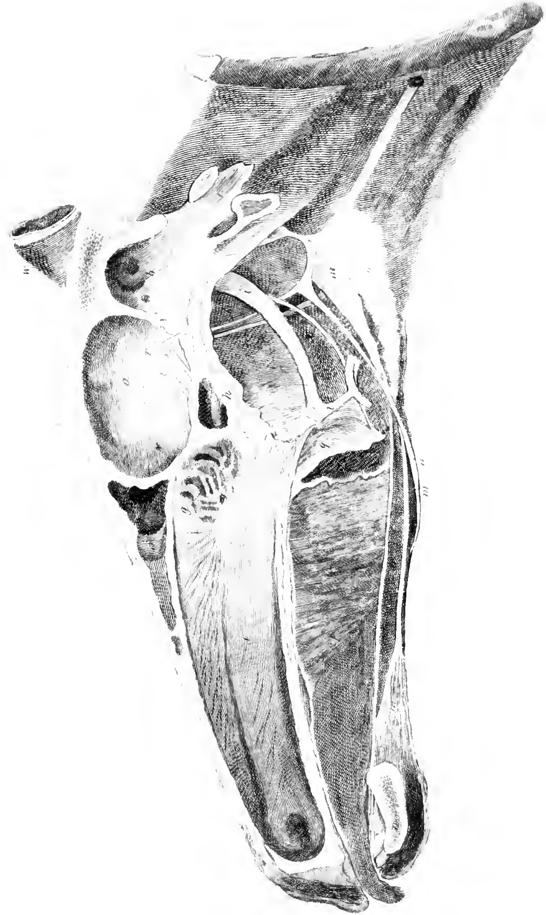
The Panniculus Carnosus.

Providence having denied hands to quadrupeds, has given them in lieu a muscular expansion, having a cellular attachment to the integuments, and being extended nearly over the whole body, by which means they are enabled to corrugate the skin, to shake off dust, prevent the attack of noxious insects, and perform other purposes necessary for their ease and convenience. This *fleshy pannicle* is a thin muscle, or rather pair of muscles, found only in quadrupeds, and not in the whole of them; of which the porcupine, and porcine tribe, with some others, are instances: in the horse it is strong; but, in the ox, sheep, and dog, particularly so. In different animals its attachments are different, and, accordingly, its actions and powers become varied also. La Fosse describes all the portions of this investing pannicle, as four pairs of muscles proper to the skin; but, agreeable to other authors, I have considered the portions which act on the head and neck, as proper cutaneous muscles to those parts.

The panniculus carnosus is not equally thick in every part; in some its muscular fibres are considerable, in others they are less so; and, in some, its attachments are simply aponeurotic. The muscular parts may be regarded as the centre from which the others are moved; and thus, as either of the aponeurotic or extreme points may become fixed, so it is capable of acting in every direction. It acts to greatest advantage when the animal is at rest, because then the parts to which it is attached are fixed; these attachments are very numerous, and not easy to define. Describing it on one side only, it may be said to be anteriorly connected to those muscles, which, by their form and situation, are called the cutaneous muscles of the neck; and which, as we have before said, appear to act the part of a fleshy pannicle to the neck and head: it is likewise attached to the muscles of the shoulder, and is extended down the front of the scapula, adhering very closely to the spine of that bone, its fleshy portion ending at the superior part of the arm; but its aponeurotic being continued into the similar expansion of the muscles of the canon, by which it can shake the skin of this part when necessary. Posteriorly, it extends its fleshy portion backwards over the convex and middle parts of the ribs; but its aponeurosis adheres to the cervical ligament, trapezius muscles, and spinous dorsal processes: more inferiorly, it is attached to the pectoralis and latissimus dorsi, and is continued by a species of fold on the inner side of the aponeurosis, terminating with the latissimus dorsi, by which means it can act on the internal, as well as on the external, part of the arm. It is not continued completely over the false ribs, being attached superiorly, as we have shewn; when forming a kind of division, it is continued inferiorly and posteriorly by a strong aponeurotic expansion to cover the external oblique muscle, with which it is intimately connected, to be continued into the groin, partly covering the penis, and then continuing onwards to unite with the fascia of the inside of the thigh: externally it is continued much stronger, in an aponeurotic expansion, over the muscles of the thigh, blending with the fascia of the fascia lata.

The fleshy pannicle is very plentifully supplied throughout with nerves, which are distributed to it in very considerable branches, and which likewise many of them penetrate it to





enter the skin. A very large bundle enters it from under the shoulder, and it receives one or more twigs from between each rib in its whole course. It is likewise as well supplied with blood vessels from the intercostals, and neighbouring parts. It must, therefore, be evident, that its irritability is great, and its general living powers very considerable, which is favourable to its purposes, which are evidently that of a constrictor to the skin in almost every part of the body; shaking and corrugating it in any and every direction.

ANATOMY OF THE HEAD.

Of the Head generally.

THE parts forming the head are considered as external and internal. The external parts are the hair, the common integuments, the muscles, the glands, the external parts of the organs of sense, the periosteum, pericranium, and the bones by which these parts are supported. The internal parts are the brain and its appendages; the deep seated parts of the organs of sense, with the cavities attached thereto. Some of these parts have been already considered in their proper places; such as have not, we shall proceed to describe.

The Ear.

The *ears* are formed of an inner and outer part. The internal parts do not very materially differ in different quadrupeds of the higher orders, nor from the human; but the form of the outer ear is very wisely adapted to the various habits and manners of the animal on whom it is placed; and in almost all it differs much from the human external ear. In brutes it is advantageously formed to take in a vast number of sonorous waves or rays of sound, and is usually mobile, and easily directed towards the quarter from whence the sound proceeds, and which form is peculiarly observable in the horse, whose ears are almost constantly in motion every way. In the predacious tribes the ears are directed forward; in the graminivorous and timid, they are directed backwards: and in whatever way we regard the external ear, we shall find it admirably adapted to the habits of the animal of which it is a portion.

The *external parts of the ear* are the hair, skin, glands, muscles, cartilages, meatus auditorius externus, and membrana tympani. The hair, which garnishes the tube internally, is long and fine, and thereby guards the organ from the effects of wet, cold, and the attack of insects; hence the clipping of this close, as is usually done, may prove in some cases very prejudicial. The skin within the external ear is soft, and furnished with the general sebaceous glands, and also with a larger kind called ceruminous, and peculiar to it, by which is secreted a bitter whitish substance, intended probably to prove noxious to insects. The *muscles* of the ear in the horse are numerous and powerful, and are described in the Myology. The *cartilages* of the ear are three; the concha, or grand, the internal, and the anterior. The *concha*, or principal cartilage, is that conical body which gives figure and form to the ear, being externally convex, and internally concave; it is covered by the skin and muscles externally, and internally by cuticular folds which form longitudinal eminences and depressions throughout the extent of the ear. The grand fossa appears like a cone, cut, not parallel to its base, but in an inclined direction from above downwards, leaving the ear elegantly pointed above, forming a circular cavity below, and an irregular oval opening outwards. This cartilage is fixed to the petrous process of the temporal bone, by means of two appendicles, and is further maintained in this situation by ligamentous attachment. Within this, and attached likewise to the auditif canal, is the *internal cartilage*, which is a small moveable portion, whereby the external cavity is rendered more tortuous: but the tortuosities of this cavity in the horse are not so numerous as in the ear of some quadrupeds; in the dog they are extremely complex as well as numerous. The *anterior cartilage* is situated at the anterior part of the base of the great concha cartilage; it is irregularly triangular, and has a ligamentary expansion inserted into the parietal bone, upon which it moves freely. The *meatus auditorius externus* is in part bony, and in part cartilaginous; and very tortuous, whereby its surface is much increased: it enters the bony canal in the petrous part of the os temporis, whose extremity is furnished with a cartilaginous appendage. The *membrana tympani* is the covering of a cavity, called the *drum* of the ear, from its supposed resemblance to that instrument, over which this delicate membrane is expanded, and by which the inner is separated from the outer cavity. The tympanum, it is supposed, has little muscles, giving it by their contractions different degrees of tensity, and which thereby fit it to receive the impressions of the air.

The *internal parts of the ear*, are the *cavity of the tympanum*, with its contents and appendages. This cavity is irregularly spherical, and presents several prominences and subordinate cavities. It contains likewise four small bones, which are named, according to their supposed resemblances, incus, malleus, stapes, and orbicular; by whose movements it is conjectured the impressions received by the membrana tympani are regulated, and receive modifications from the cochlea, and more interior parts. These bones are moved by three muscles, two of which belong to the malleus, and one to the stapes. (See *Myology.)* The internal ear presents several openings; as those of the mastoid cells, the eustachian tube, and the communication between this cavity and the labyrinth, called the fenestra ovalis. The *mastoid cells* are small irregular cavities in the substance of the mastoid processes, lined by a fine membrane, and communicating with each other; having a common entrance near the eustachian canal. The *eustachian tube,* is an opening at the upper and anterior edge of the hollow of the tympanum, forming a duct which is in part bony, and in part cartilaginous; extending from the tympanum to a great membranous cavity at the posterior part of the nasal fossa. At its commencement the eustachian tube appears to be merely an excavation of the petrous apophysis of the temporal bone, further extended by a portion of the sphenoid. From this it proceeds cartilaginous to terminate, as was said, in a large membranous vault, having a cartilaginous valve (*vid. d, Fig.* 1, *Pl.* III).

The *eustachian cavity,* is this large membranous sac, whose use is not known*; and whose size and appearance bear no resemblance to the part of the same name in the human, which in him is nothing more than the cartilaginous enlargement of the eustachian tube; nor is it by any means equally considerable in other quadrupeds: but in the horse it forms a very considerable cavity, one proper to each side of the head, the two being opposed to each other, but with some intermediate space between. Its posterior part is turned towards the occipital bone, its superior towards part of the pharynx; anteriorly towards the great nasal fossa, and inferiorly towards the inferior part of the pharynx. To examine this interesting peculiarity in the horse, it is necessary to make a section of the head, when on each side will be seen this membranous oval space, formed in the lateral part of the pharynx, and each closed by a fine septum. Upon removing either of these septa which separate it from the pharynx, the cavity is brought to view, within which are seen a part of the os hyoides, a lingual branch of nerves, the trunk of the carotid, and the continuation of the jugular, all of them passing up its outer surface (*vid. Pl.* III).

The *fenestra ovalis* is usually considered as another opening of the tympanum, although it is little more than a hole of communication between the tympanum and the labyrinth. The *fenestra rotunda* is situated inferiorly to this, and is the entrance to a particular duct in the labyrinth. The *vestibule* is a cavity in the petrous portion of the temporal bone, immediately be-

* It has been suggested, that this hollow is probably intended as an assistant to the action of neighing in horses, and braying in asses: but as each has a membrane by which it is shut out from immediate connexion with the larynx and pharynx, it does not appear easy to conceive how it can influence these sounds, unless by the oscillations of the membrane itself. Bourgelat speaks of it, as a cavity open with the pharynx; but I have always found it, as I have said, separated by a fine membrane: perhaps, in the usual mode of examining it, this membrane has been torn through. From analogy, it would be more reasonable to suppose it connected, as in man, with the sense of hearing.

yond the tympanum; and the fenestra ovalis is the common opening to them. The *semicircular canals* are described as three osseous canals of nearly a semicircular form, within the substance of the bone, communicating with the vestibule. The *cochlea* is a double spiral canal, within the pars petrosa, opening also into the vestibule. These spiral convoluted canals are divided from each other by a lamen of fine membrane, and the whole are filled with a thin fluid, to perfect the undulations communicated by the drum. The *nerves* of the inner and outer ear are principally furnished from the seventh pair: each auditory nerve soon separates into two portions; one of which passes by several small holes into the cavities of the vestibule, cochlea, and semicircular canals, and is spread on their surface in a soft pulpy form; and is thence called the *portio mollis.* Of this nerve, the other branch receives the name of *portio dura,* which passing out by the stylo-mastoid hole, it parts with a ramus, which, uniting with a twig of the inferior maxillary, crosses the tympanum, and thence receives the name of *corda tympani,* being finally ramified around it. The remaining trunk of the portia mollis is distributed to the face. (See *Neurology.)*

The arteries of the internal ear are branches from the external and internal carotids, and from the vertebrals; and their blood is returned by two appropriate veins, which pour it into the jugulars. The outer ear receives its arteries from the external carotid, by a branch, called the auricular, arising immediately from either the temporal or maxillary branches of the carotids; the blood is returned by similar veins into the jugulars.

Sense of Hearing.

The collision of elastic bodies produces phenomena which are called sounds. A tremulous motion appears to be communicated to the surrounding medium which extends in all directions, and thus reaches the external ear; whose form is admirably adapted to receive a large portion of these sonorous waves, which are then reflected from the cartilaginous sides of the concha, till they reach the bottom of the outer ear. Becoming impinged on the membrani tympani, or ear drum, they force it into similar oscillations; which being communicated to the fluids in the spiral channels of the inner ear, finally act on the acutely sensible expansion of the auditory nerve*, and produce those sensations we call hearing.

* It may be observed that there is a considerable similarity between the senses of hearing and touch, which both take cognizance of bodies by their mechanical properties, whereas the senses of smelling and of taste are operated on by the chemical properties of the bodies examined. The sense of vision appears to be compounded of both: the forms of bodies are submitted to our vision by their mechanical admeasurement; but their colours are taken cognizance of by some chemical action of light on the bodies viewed.

The Eye.

The phenomena of vision have engaged the attention of the curious in every age, and the structure of the organ by which these phenomena are brought about, has occupied the anatomists of every country. It is impossible to contemplate the perception of the organs of sense, without being struck with admiration, that the same substance, the brain, should by modifications, not to be detected by the minutest examination, produce such varied results as are brought about by nerves furnishing the organs of sense with their different sensibilities. The eyes of the horse are not situated, as in the human, directly in front of the face, but more laterally, to increase his field of view. The organ of vision may be divided into the appendages of the eye, and the eye itself. The eye-ball is situated in a funnel-shaped cavity, formed by the concurrence of several bones, called the optic orbit. (See *Osteology*.) Within this socket, the globe, surrounded by its moving agents or muscles, rests on a quantity of fatty gelatinous matter, serving to prevent the effects of friction*. The optic orbits are lined by a periosteum furnished by the dura mater. The globe of the eye may be considered as made up of parts investing, and parts invested. The parts investing are the muscles, the true tunics, or coats, and the simple expansions. The parts invested are the more internal expansions, the humours, and their capsules.

The *coats of the eye.*—The *conjunctiva* is a fine delicate and transparent membrane which lines the internal superfices of each eyelid, and is reflected from thence over the anterior part of the globe of the eye: being thus reflected, freedom of motion is allowed, yet the eye is amply secured within the orbit, and the entrance of any foreign substance beyond the duplicature completely prevented. The conjunctive coat, where it is opposed to the pupil, is transparent, to admit of the visual rays; and here, therefore, although it be not entirely deprived of vascularity†, it does not admit of any other than the colourless parts of the blood. That portion which lines the eyelids, on the contrary, is highly vascular, and forms a secreting surface for the mucus furnished to defend these parts from the irritation of the tears.

The *sclerotica* is the outermost of the more complete investments of the eye; and is likewise the thickest and strongest, forming all the posterior and larger part of the globe; the re-

* It is the absorption of this adipose substance through age, which gives to the eyes of old horses their sunken and retracted appearances; and also that depth of cavity over the pits seen in the aged.

† Under inflammation, the conjunctive vessels are impelled to carry red blood, as we see in violent ophthalmic cases. It is an inflammation of this coat that appears the principal seat of the ophthalmic affection to which the horse's eye is so liable; and which inflammation appears in him specific; commencing in the external coats of the eye, but terminating in the lens.

mainder and smaller portion of the sphere being formed of the cornea, and which has been thought to be only a continuation of the sclerotic expansion in a transparent form, and which has thus given rise to the terms of transparent and opaque corneas. The sclerotic coat is of a firm fibrous but elastic texture, perforated at its posterior part by the optic nerve, but not directly in a line with the centre of the pupil; and is likewise perforated obliquely in other parts by nervous filaments and blood vessels. It is but little vascular, or sensible; and hence not much subjected to disease. The *cornea transparens* is that transparent portion which extends over the anterior part of the bulb of the eye; forming in itself the segment of a sphere, distinct from that portion of which the posterior part of the globe is formed: appearing thus like a segment of a small sphere, adapted to the segment of a larger one, or as though a large cup existed posteriorly, having a smaller cup applied to its margin anteriorly. The convexity is very different in different subjects, by which the focal distance is adapted to the viewing of near or more distant objects, according to the habits and manners of the animal. In man the focal distance of the eye is less than a foot, and thus his cornea is considerably more convex. But the horse has to see objects from his eye to the ground, where the substances he most usually studies are placed; in him, therefore, the convexity is less, and the focal distance of his eye is probably some feet. The cornea is sensible, and possesses a considerable degree of vascularity; though in a natural state it admits only the colourless parts of the blood: but under inflammation, when the diameter of the vessels becomes increased, the red particles are seen circulating through it; and which alone is a sufficient proof of its vascularity, and serves to account for its tendency to disease. For a long time this was disputed, and it was considered to be merely cuticular, and as such all its diseases were treated mechanically; from whence sprang the antient empirical and travelling oculists, who, in cases of opacity of this substance, introduced powdered glass within the eyelids; or made use of other means to rub or scour away the opaque part by mechanical friction: but we now know this to be organized and possessed of considerable living powers, whereby it exhibits the various phenomena of other parts. It inflames, it deposits coagulable lymph, and it takes it up again, or it suppurates, ulcerates, and afterwards reunites. I have seen in an ox a large fungous excrescence arising from the very centre of the transparent cornea, and communicating directly with no other part. This tunic is in different animals of different shapes, but in all it is admirably adapted to their various habits and manners: in the human, it is circular and small, but in the horse very little of the opaque part, or white of the eye, is exposed; but a very large surface of transparent matter, of a horizontal oblong shape, is exposed to the influence of the rays, by which means vision is very perfect in him. The cornea is formed of several laminæ which are separable by putrefaction or boiling.

The *internal expansions.*—The *iris* has been described by some anatomists as only a continuation of the choroides, but it is now more generally considered as a distinct muscular part, intended to regulate the focal distance of the eye, by directing the rays through particular portions of the crystalline lens. It is difficult to detect its structure, though in a dog's eye the muscular fibres appear to be demonstrable; and, under the influence of a high magnifier, it seems composed of two lamen, between which may be seen two plans of muscular fibres; one of which, the orbicular, surrounds the circumference of the pupil; the other, which is radiated, is attached by one extremity to the outer edge of the iris, and by the other to the orbicular plan. It will not, therefore, be difficult to conceive in what manner the actions of the iris are brought about: by the orbicular it will be contracted, and the rays in a great measure shut out; and by the radiated it will be dilated, and more rays permitted to enter. The iris is situated within the cavity of the globe, immediately under the cornea; to which it corresponds in its shape in all animals, being in the horse an horizontal oblong, by which means objects on each side can be distinguished, which are such as he most wishes to observe: for by this means he not only is enabled to see his food, but to avoid his enemies, which are not likely to attack him from above or below, but on a level with himself: by this means, likewise, he takes in the best field of object for his appetite, seeing those herbs on each side that he wishes to select. A similar formation exists in the ox and sheep; but in man, the direction of the iris is circular, for by his habits and manners, but more particularly by his intelligence, he is to take cognizance of objects in every direction. The iris has a power of contracting itself, either partially or generally, thus accommodating it thereby to any individual object. The colour of the eye depends on the iris; thus in the human it is commonly grey, black, or blue: in the horse it is usually brown, but now and then white, when the animal is said to be *wall-eyed.* The space between the inner circumference of the iris is usually termed the *uvea,* or *pupil,* whose size increases or decreases as the iris contracts or dilates. The colour of the pupil is dependent, in a degree, on that of the bottom of the eye, and the transparency of its humours: but in a degree only; for the pupil of the horse is of a uniform greyish tint, though the substance at the bottom of the eye may be of very different shades. At the margin of the iris are seen some little globular bodies or bags covered with a black pigment, usually attached to the upper margin only, and when any exist on the lower they are small: these bodies appear designed to stifle a portion of the rays; and which, in a contracted state of the iris, when the pupil almost forms a circle, so fill up the remaining opening as to admit but little light. The iris therefore, it is evident, is a very important part, for by its actions, vision is in a great degree regulated. The *choroides* is an expansion of a very vascular structure, which is spread on the internal surface of the sclerotic, from the entrance of the optic nerve nearly as far as the cornea, where it turns inwards, forming plaits or folds, called the *ciliary processes*, and which are attached to, and spread on, the anterior and outer portions of the crystalline lens. Just before the choroides makes this inflection, its outer lamen is firmly fixed to the sclerotica by a sort of ligamentous circle, which is termed the *ciliary ligament*. The *membrana tapetum* and *nigrum pigmentum* perhaps might, on a hasty view, be considered as one and the same; though the former is supposed peculiar to the brute eye, while the latter exists in both man and beast. The *pigment** appears to be a black mucus spread over the tapetum, and extending over the internal layer of the choroides, particularly at its anterior part, extending between the ciliary processes, and adhering to the vitreous humour, forming a ring around it, which in the human is termed *zonula ciliaris*. It also covers the three or four little bags which are attached to the inferior edge of the superior portion of the iris. The *tapetum* is a variegated expansion at the posterior part of the choroid coat, over which the pigment is spread. It appears that the lighter the colour of the tapetum may be, the better the animal can see at night; that is, a less quantity of perceptible rays are necessary to distinct vision in such animals than in others in whom this expansion is darker. In man, therefore, in whom the variegated expansion is wanting, and its place supplied by the dark pigment, the sense of seeing is very indistinct in the evening. But in those animals, whose habits lead them to prowl during the night, it is very light in colour, giving all the advantages we have described. In grazing animals it has a tendency to a greenish cast, whereby they are enabled to collect the rays corresponding to the colour of their food in great plenty, and yet in them it is sufficiently light to answer the purposes of nocturnal vision. In dogs likewise, who see remarkably well in the night, it is greyish; but in the cat tribe it is very light, and adapted to receive all the rays it meets with: hence they probably see better than

* The pigment is generally black in man, but of various colours in different animals; and as this variety extends to such animals as feed alike, its intention cannot be to reflect the colour of the food. In some animals it is deficient, as in the cream-coloured horse, white rabbit, and white-haired human albino; in all which, the blood circulating in the choroid is seen through the pupil, while in the common eye the vessels are obscured by the black pigment.

any of the domestic animals. The *retina** : —The last, and most important expansion, is the *retina,* from its supposed net-like structure; though it has no particular reticulated appearance upon observing it microscopically, nor does it present any decussation of fibres or interstices, except those made by the entrance of minute vessels; but on the contrary it appears composed of fibrillæ, whose diameter is supposed not equal to the 1200th part of an inch; which give it the appearance of a very fine downy medullary and transparent lamen. It appears a true expansion of the optic nerve, which enters the optic orbit behind, piercing the sclerotic and choroid coats, and spreading itself over the internal surface of the globe, to terminate within a very short distance of the ciliary circle; by this means reaching as far as it is possible for any rays to produce distinct vision; for it is only where this expansion exists, that the eye is susceptible to the impression of light. Objects, it is thought, are painted on the retina, in an opposite direction to their real situation; for the rays proceeding from the superior portion of a body, as they pass through the upper part of the refracting bodies, are bent so as to reach the lower portion of the bottom of the eye; and those from the bottom, the upper part: but though this appears inevitable, the mind, either from the decussation of the nervous fibres, or from the influence of habit, takes cognizance of them in an upright direction. It is evident likewise, that each eye receives and transmits a picture to the brain; but it is likewise probable, that these two transmitted portraits, by meeting at one point on the sensorium, give the idea of one object only.

The *humours* of the eye, and their capsules, come next to be noticed. The *vitreous humour* is of a jelly-like form and consistence, and fills all the globe, except the spaces occupied by the aqueous humour and the crystalline lens, corresponding in extent to the expansion of the retina; thus occupying the posterior part of the space, as the aqueous fills up the anterior, with the crystalline lodged between them. It appears to be in greater quantity, according to the bulk of the eye in the horse, than in man, and consequently the aqueous is less. It is surrounded by a capsule, termed *tunica vitrea,* the anterior part of which is covered by dark lines from the black mucus of the choroid, and which form, as already noticed, the zonula ciliaris. The *crystalline humour* forms a lenticular body of a tolerably firm consistence, therefore it can hardly with propriety be called a humour; but is more properly termed the *crystalline lens.* It is by the refraction of the rays of light through this substance, that vision is brought about; and hence different animals have it of different figures: in the horse it is more sphe-

* An exquisitely fine expansion has been discovered and described by Dr. Jacob, of Dublin, in the human eye, and which is situated between the choroid coat and the nervous pulp of the retina.

rical than in man, being in the latter as 1 to 2; in the horse as 2 to 3; and in the ox as 5 to 8: in fishes it is still more perfectly globular. It is not of equal consistence throughout, but is much firmer in the middle, and its diameter is greater; and thus, as the refraction of the rays of light are in proportion to the density of the medium through which they pass, so, by the contraction of the iris when the animal looks at near objects, he can force the rays to pass through the centre, whereby they become so much bent as to form a proper picture on the bottom of the eye. The less central parts being of a much thinner consistence, refract less, and are therefore better adapted to receive distant objects. It is said to be composed of several laminæ, and under the microscope appears fibrous; it is also contained within a proper capsule, which is ultimately blended with the tunica vitrea. Between the capsule and the lens there is a small drop of fluid to prevent friction, called *liquor Morgagni*, from the discoverer; and the whole of it, as well as its capsule, we know to be organized; and thus ophthalmia, or the specific inflammation of the eye, usually ends by a deposit of coagulable lymph, and finally forms cataract: the vessels of the capsule likewise sometimes ossify. The crystalline lens is situated within a fossula in the centre of the anterior part of the vitreous humour, just behind the iris, but is not connected to it: the space between it and the iris, which is very small, is called the *posterior chamber* of the eye; as that between the iris and cornea forms the *anterior chamber*. The ciliary processes are seen, as we have described on its anterior part, and all the surface between their extent is penetrable to the rays of light, and forms the true pupil. The use of the lens appears to be to increase the refraction of the rays more than the other parts of the eye; and the existence of this lenticular body is urged as a proof that the adapting the eye to distances is not an act of the recti muscles.

The *aqueous humour* is a limpid fluid which fills up the anterior and posterior chambers of the eye, and consequently it occupies the anterior parts of the globe; that portion of it behind the iris being very inconsiderable. It does not seem to have any proper capsule, but appears secreted by the arteries of the inner surface of the eye, and is capable of regeneration, in cases where it has escaped, in the operation of extracting for the cataract. The *muscles of the globe of the eye* are seven: four of these are termed *recti*, or *straight*, and perform the offices of elevation, depression, abduction, and adduction; from whence they receive individual names, as abductor, elevator, &c. They all arise from the bottom of the orbit, and are inserted into the anterior part of the sclerotica, either above, below, or to one side, according as they are to operate, by a tendinous expansion which extends as far as the edge of the cornea. Two others of the seven muscles are termed *obliquus* *major* and *minor*, or *trochlearis* and *antagonista*. The first of these arises from the inner and posterior portion of the orbit, and passes obliquely through a cartilaginous ring at the anterior and inner part of it; then returning, it passes under the levator rectus, to insert itself into the anterior and superior part of the globe: this, therefore, can draw the eye forward. The obliquus minor arises from near the nasal duct in the angular bone, and inserts itself towards the inner side, under the depressor rectus. Mr. Hunter conjectured, that these two muscles in conjunction could rotate the eye. The *retractor oculi*, or *choanoid*, forms the seventh muscle, and is peculiar to quadrupeds; being a very large and powerful bundle of fibres, arising from the bottom of the orbit enveloping the optic nerve, and inserting themselves around the middle of the globe. This muscle acts on the globe of the eye, by very forcibly drawing it within the bottom of the orbit*, by which means it effectually protects it from injury: and as it is present equally in quadrupeds who do not graze, as in those who do, as dogs, cats, &c., *suspensory* appears a wrong term for it; and it is clearly more proper to call it the *retractor*. The *membrana nictitans* appears an appendage to this muscle, having all its actions dependent upon it. It consists of a firm cartilaginous substance, situated at the inner canthus, hid by the eyelids, except a very small dark portion: but under inflammation of the eye, a large portion of it projects forward, which appears to arise from the action of the retractor muscle, drawing the globe inward to avoid the irritation of the light. The eye being imbedded in soft fatty substance, can be drawn backwards by a displacement of the fat, which latter being pressed forwards, acts on the nictitating cartilage and forces it over the eye; for which reason it appears to have no appropriate muscle of its own, but acts always in concert with the retractor. From this description it will be readily seen that it acts as a third eyelid, and amply makes up the deficiency resulting from the want of hands†; it even more effectually wipes away dust, or other foreign bodies, than the fingers can possibly do. By farriers it is called the *haw;* and so unacquainted are they with its use, that when under inflammation of the eye it is drawn forward, as a protection against the stimulating effects of the light, it is mistaken

* I was some years since requested to attempt the removal of a considerable excrescence that grew on the transparent cornea of a very valuable ox, in Sussex, where they are used in husbandry. On casting the animal, and forcibly keeping his eye open, the retractor muscle drew the globe so strongly within the orbit, as to elude all my attempts to reach it. It was uncertain and hazardous to attempt getting at it by the orbitary fossa, and I was therefore obliged to desist from my attempt.

† The monkey is an exception among quadrupeds; but which may readily be accounted for. Nature gives nothing in vain; and as this animal uses his fore-paws with great dexterity, so he is enabled, by this means, to defend his eyes sufficiently, and, for the same reason, it appears denied to man.

by them for an excrescence, or diseased enlargement, and as such is often cut off; and which gross practice is still recommended in some books of farriery, even of late date.

The *eyelids and their appendages.*—The palpebræ are a species of curtain placed before the eye with a section between, whereby they are divided into upper and lower lids. They are highly useful to animals, by defending the eye from the attack of insects when they sleep, and from blows, or extraneous matter at all times; they likewise ease and relax the whole structure of the eye, by shutting out the light, during the act of winking; whereby the optic nerve and iris losing their stimulus, cease their contractions, and enjoy a state of rest. The superior is the most considerable, the lower is less, and has but little motion: the places of their union are termed *angles,* one of which is internal and larger, the other external and smaller. They are made up of hair, skin, and cellular membrane; and have appendages, which are the muscles, the tarsi, the cilia, and the puncta lachrymalia. The *tarsi* are thin cartilages, which form the edges of each eyelid; those of the superior are larger than the inferior, and the edges which are applied to each other are termed *ciliary:* they have ligaments which are membranous elongations from the periosteum of the orbits, and which are attached to their edges; these form the eyelids themselves, but are farther covered with the skin and muscles, as we shall explain. Along each ciliary edge are seen some little holes, called *puncta ciliaria,* which pour out a sebaceous matter. The *cilia,* or *eyelashes,* of the horse, are not similar to those of the human; the upper lid only is furnished with hairs immediately on the edge, and which are not placed in one, but in several small rows: the under has a few hairs only placed below the marginal edge. The horse has no supercilia, or eyebrows, unless we reckon as such the few straggling long hairs above the eyes. The *muscles of the palpebræ* are two; one surrounding the whole orbit, with its strongest part above, termed *orbicularis palpebrarum,* which shuts both eyelids; the other, proper to the upper lid, is termed *levator palpebræ superioris,* and arises from the bottom of the orbit, to be inserted into the upper lid, by which means it elevates it. These muscles have a compound and subordinate action, called *winking.* The *lachrymal gland* is a conglomerate body, lodged within the conjunctiva at the upper part of the orbit, in a fossa above the external angle; its several lobuli together send out five or six little ducts, which penetrate the conjunctiva, and pour out a saline fluid, called the *tears,* which lubricate the eye. This gland secretes more or less, according to circumstances; as when the wind is strong, it is stimulated into increased action; under inflammation also it secretes very largely. The tears, though they assist the eye in its motions, would stimulate and irritate, if it were not for the mucus spread over the cornea, secreted by the conjunctiva: thus in the human, a watery eye excoriates the cheeks, from the fluid flowing over the eyelids; and this gives the turgescence and redness seen in the human eye from crying*. The *puncta lachrymalia* are two openings which receive and carry off the tears that have been forced over the eye by winking: they are situated within the inner angle, and, in the human, conduct the tears into a sac, called the lachrymal; but in the horse there is no such, but the duct itself from each eye is conducted into the nose. The *caruncula lachrymalia* is a small body, whose substance is supposed to be glandular, situated between the internal angle of the palpebræ and the globe of the eye. It appears black in the horse, and red in man, and has a kind of fold of the conjunctiva, but is not entirely covered, as in the human, by this membrane: its principal use appears to be to direct the superfluous moisture secreted by the lachrymal duct to the puncta lachrymalia, from whence it is carried into the lachrymal duct, and so passes into the nose by the ductus ad nasum. (See *Osteology,* and *Description of the Nose.)* The vessels of the eye, are arteries, from the external and internal carotids: the external parts being furnished by the maxillary; and the internal by the ocular and some branches that penetrate the sclerotic coat, and veins which return their blood by the jugulars. The nerves are, besides the optic, some smaller ones, principally from the third, fourth, fifth, and sixth pairs. (See *Neurology.*) From the great vascularity and sensibility of the eye, it is very susceptible of disease; the two principal of which are cataract and gutta serena, both of which in the horse are even more obstinate and incurable than in the human. Cataract in the horse, called by the farriers moon blindness, appears to be the effect of a specific inflammation peculiar to him. (See *Diseases of the Eyes.)*

Sense of Seeing, or Vision.

Light is a matter, or fluid, sui generis; passing from the sun to the earth with an astonishing quickness: and though these rays of light pass through the atmosphere, nearly in a right line in its ordinary state, yet when they pass through other media, they do not preserve this rectilinear course, but are bent towards a perpendicular in a degree equal to the density of the medium through which they pass. This bending of the rays is called their *refraction;* and upon which most of the phenomena of vision depend. The disposition to converge in the rays, as they pass through denser media, brings them finally to a point, and which is called their *focus,* or *focal point:* thus in a sphere of glass, as being a denser medium than one filled with water,

* The horse is now and then found to have an additional lachrymal gland, *glandula Harderi,* which is more common to other quadrupeds.

the focal point will be only a fourth part of the diameter; but in a convex lens of glass forming part of a sphere, equal to 30 degrees, the focus will be a semi-diameter of the lens. It must, therefore, become evident, that the rays meet with several different refractions, or bendings, in passing through the eye; as they pass through media of such different densities. The passage through the cornea and aqueous humour must form their first refraction; and the more convex is the general form of the eye, the more must the rays be bent. But the crystalline has the greatest share, being of a lenticular form, the powers of which, as a refracting medium, must be great; add to which, that the rays in their passage through the vitreous humour must undergo a still farther bending, till they meet in a point on the retina. Thus it may be judged, the rays travel their course in such a manner, that, having reached the retina, they form a cone, the basis of which will be the surface of the cornea, and the apex the radiant point.

Amidst the wonderful number of objects that present themselves to the view of the animal, it appears that care is taken, that he shall have the means of collecting such only as are immediately, in some measure, connected with his views or pursuits; and even if he take in the general field, the eye is so admirably formed, that no confusion will exist: hence only such rays enter as are capable of this convergency, or if any others penetrate, they become lost in the nigrum pigmentum. Those rays, therefore, which the refracting power of the humours is able to concentrate, meet upon the retina in a point, or very small circle, within which the object is painted, and the mind takes cognizance of it through the medium of the optic nerves. As the eye must necessarily require to have a vast variety of objects painted upon it, whose distances are widely different; so there must be some optical adjustment of the powers of the part, to enable it to effect a distinct vision of all objects remote or near. But whether this be effected by the angle formed on the two opposite axes; or, as has been more lately taught, by a muscular power in the lens itself, is not yet satisfactorily proved: certain it is, that after the loss of one eye, time is required for the remaining eye to learn to adjust distances; and this equally in the human and brute subjects*. Were it not for

* Mr. Cline, in his lecture on the eye, used to mention a getleman who was possessed of a valuable hunter; but which he found became from an excellent leaper, unable to measure his distances, and therefore, at times, made a violent spring at a low quickset; and, at others, fell far short, and threw himself and rider into a ditch. Upon the owner's mentioning this circumstance accidentally to Mr. Cline, he hinted that it might arise from the loss of one eye; and, on examination, it was found the animal had, unperceived, actually become blind on one side. Nor can horses, in general, who have lost an eye, be trusted safely to hunt till they have learned to adjust the distances, which time enables them to do.

some adjustment of the optical organs, the rays reflected from objects very near the eye would fall behind it, and those from very distant ones would, from being almost parallel, meet together before the retina. The mechanical adjustment of the focus is also assisted in some measure by the iris, which contracts almost to a point when we look at a very minute object; and by this means only permits such rays to pass through as penetrate the centre of the lens, by which the rays will be very much refracted; but when the eye regards distant objects, the iris becomes dilated, and the rays are then received through the edges of the lens, by which their refraction becomes greatly lessened.

The Nose.

In brute animals, the organ of smelling is, next to that of seeing, the most essential, as it forms the principal means by which they judge of good or evil: consequently we cannot be surprised that the nose of quadrupeds is very differently formed, and much more extensive than the human nasal organ, in whom the deductions of reason and comparison are intended to supply the instinctive acuteness. In the horse, therefore, the nose, it is seen, constitutes a very considerable portion of the head, being formed of two principal cavities, each having an exterior communication with the air, called the *nostril,* and an interior opening at the back of the mouth. These cavities are composed of common integuments, of muscles, of bone, of cartilages, and of membranes, with their proper vessels and nerves. The cavities of the nares or nostrils are limited anteriorly by the nasal bones, superiorly by the frontal, sphenoidal, and ethmoidal; laterally by the inferior and superior turbinated bones, and posteriorly by the palatine, and palatine portion of the maxillary bones. Immediately above the arch of the palate the nares reach upwards, and communicate with the frontal sinuses anteriorly, with the ethmoidal superiorly, and with the sphenoidal a little posteriorly and superiorly. They are divided in the middle by the septum narium, which is above bony, and below cartilaginous: the bony part is formed by the vomer, which uniting to the spine of the sphenoid, and to the middle lamen of the ethmoid, extends downwards, being received by its anterior edge between the junction of the nasal, and by its posterior into the groove formed by the union of the palatine bones, and of the palatine part of the maxillary with each other. Having extended some way, it unites with the cartilaginous septum; which is continued down in the same manner as the vomer, that is, it is received anteriorly by the nasal bones, and posteriorly by the maxillary, till it arrives near the end of the nose, when it bifurcates into two portions.

The *frontal sinuses* are formed by the separation of the two tables of the frontal bones. (See *Osteology.*) There is usually a bony partition which forms them into two equal portions, and frequently other bony prolongations are seen supporting the parieties. These sinuses communicate superiorly with the nasal cavities, and are lined by the same membrane: in ruminant animals they are subject to be infested with a species of fly. The *sphenoidal sinus* is formed from a vault in the middle of the substance of the bone of that name, communicates superiorly with the nasal cavities, and is also lined with the pituitary membrane. The *ethmoidal cells* likewise communicate with the nasal fossæ superiorly, and are formed from the numerous cavities in the ethmoid bone, and which are likewise lined by the same membrane. The *maxillary cavities* can hardly be called sinuses; because though the maxillary bone itself forms an immense cavity, yet it is, as it were, shut and nearly filled up by the *turbinated bones,* which have been described in the Osteology; they however, by their tortuous direction within the nasal cavities, and their cellular and spongy texture, very considerably increase the surface of this mucous membrane, which seems their principal use. The highly vascular and sensible expansion called the *pituitary membrane,* lines the whole nasal fossæ throughout all their compartments. It was first correctly described by Schneider, from whence it is frequently called also the Schneiderian membrane: it appears continued into the pharynx and larynx, and which accounts, perhaps, for the disposition in long continued glanders to affect the lungs; the connexion of the membrane of the larynx, and that of the nose, continuing the specific inflammation to the membrane of the bronchia. It appears exquisitely fine and vascular in all its parts, and is furnished with a mucus throughout its whole extent, whereby the surface is always kept pliant, soft, and susceptible; by this mucus likewise insects are prevented from penetrating the nose. The evident use of the pituitary membrane appears to be a medium for the expansion of the olfactory nerves, whereby the impressions from the effluvia of different substances are received. *Ductus ad nasum:* The puncta lachrymalia, which we described in the eye, are the openings to a canal within the angular bone (see *Osteology*), called the *nasal duct,* which is continued membranous between the turbinated bones, and terminates by an opening within the nostril near the bottom, where it may be easily seen. This duct carries off the superfluous saline fluid, secreted by the lachrymal gland. Being lined with the pituitary membrane, in glanders it becomes obstructed, whereby the tears flow over the face; and at length the matter itself flows out at the puncta lachrymalia: in inflammations of the eye, the puncta likewise become so inflamed as to be impervious for a time; hence a horse in this affection is commonly observed weeping.—The *ductus communis narium,* is a second duct of the nostrils, which passes into the pharynx; being formed by the junction of parts originating in the floor of the nostrils. The common integuments of the body are spread over the nose, except that there appears here but little adipose membrane; it is likewise furnished with fine hair to the edges of the nostrils, and is internally lined throughout with the pituitary membrane, except the inner edge, which is furnished by the skin; but blended, as it were, with the mucous covering. By an inflection of these integuments, a well known fossa is formed in each nasal cavity, called the *false nostril,* which communicates freely with the chamber of the nose, and opens externally in common with the external nares. The real passage into the nares becomes thus a long slit, and is furnished with a semilunar cartilage enveloped within its membranes, by which means the surface is kept dilated. The nose is influenced in its motions by means of three pair of muscles and a single one. (See *Myology.*) Its blood vessels are numerous, as its membrane is very vascular and extensive: it receives branches from the maxillary, from the ocular, and from the palatine arteries. Its venal blood is returned by the maxillary and palatine veins into the jugulars. (See *Angiology.*) The nerves are furnished from the first and fourth pairs. The olfactory have been already described as very large hollow tubes, which are expanded into a pulpy mass over the whole pituitary surface, rendering it highly sensible to impressions received from the effluvia of bodies. The external parts are furnished by a branch of the fifth pair. (See *Neurology.*)

Sense of Smelling.

Comparative anatomy shews that the organs of smell are in most animals set at the entrance of the respiratory organs; they are thus made subservient to both purposes, and are rendered as well voluntary as involuntary agents; for the action of respiration will carry all the effluvia from bodies, whether sought for or not, against the sensitive pituitary membrane. The herbivorous tribes smell vegetable matters better than flesh; and, on the contrary, carnivorous animals take little cognizance of vegetable bodies: it is also to be remarked, that in them the ethmoidal and turbinated cells are lamellar, whereas in the herbivorous and ruminant they are spiral and convoluted; whereby their surface of capacity is greatly increased. In all the vertebrated animals, the parts connected with the organ of smell are, like the parts composing the other organs of sense, double. The cognizance taken of the volatile parts of bodies, continually flying off from them, and impressed on the sensitive surface of the nose, is transmitted by the nervous expansion of the olfactory nerves to the brain, where it produces the sensation we understand by the name of smell.

Cavity of the Mouth, with its Parts.

This cavity in the horse forms all that extensive opening, from the first cervical vertebra to the incisive teeth; bounded above by the palatine arch, and below by the tongue; thus it becomes divided into the mouth, properly so called, and the large posterior cavity which unites and partly forms the pharynx. The mouth is composed of external and internal parts: the external are the lips, cheeks, and beard: the internal are the gums, the bars, the teeth, the alveolary edges, the palate, the septum palati, and the tongue. The *lips* form the inferior and external parts of the mouth, and are two in number; an upper and lower, or anterior and posterior, each being composed of fleshy masses fixed in different directions which extend around them jointly; but principally a circular one is apparent, forming the orbicular muscle, or sphincter oris: the rest are composed of the numerous muscular plans that perform the various motions of the mouth and lips. (See *Myology*.) They have, beside these muscular strata, a species of peculiar cellular substance interposed. The outer covering of the lips is not exactly like that of the other parts, being nearly devoid of hair, and altogether its structure is much thinner and finer; by which means, it possesses a greater sensibility, which is of great use to an animal that makes use of the lips as the organs of touch. As the outer membrane reflects to line the inner side of the lips, it becomes of still more vascular and villous a texture, and combines with the glandulous or mucous membrane of the mouth. The muscles of the lips are numerous, and their motions thereby so various, that the animal is readily enabled to collect his food, and to form and place it between his teeth by their assistance; by these means likewise the young colt sucks its milk; and, in fact, so varied are the dispositions of the muscular plans around the mouth, that, like the tongue, there is no direction in which the lips cannot place themselves. The blood vessels of the lips are furnished from the labial artery and veins. (See *Angiology*.) The nerves arise from the fifth pair, which come out at the foraminæ of the two maxilla. The *gums* are formed of the substance which appears on the alveolary edges of each jaw on either side, insinuating between the teeth, and surrounding each of their necks, so that the inner and outer gums unite; by which means they support the teeth in their situation. The substance of the gums is very elastic and compact, adhering to the bones by means of the periosteum, and being externally covered by the same strong polished membrane that covers the internal parts of the lips, and which appears formed from a union of the proper membrane of the mouth and of the cuticle: thus it participates in the colour of the general skin, being sometimes light, and at others dark: this membrane, continued from the posterior part of the alveolary edges, blends with the membrane of the mouth, and at the lower part of the channel forms a kind of fold, which the French call *barbillions*, and the English *barbs**, which folds appear to connect the tongue, and assist to confine its motions. The substance of the gums, though very plentifully supplied with blood vessels from the maxillary branches, is but sparingly supplied with nerves, which arise from the fifth pair; by which means they are very vascular, but not very sensible, except under inflammation. Were they as sensible as some other parts, the hard substances taken into the mouth, as corn, hay, &c., would hurt them by its pressure.

The *bars* are, anatomically considered, only spaces left by nature between the teeth, from the great length of the jaws; for incisive teeth continued up so high would have been useless, and never brought into action, whereby their wear would not have been equal to the others; and thus they would in the end have starved the owner: nor was it necessary that the molar teeth should reach thus far; for being so distant from the centre of motion, the animal would have found their strength very disproportionate to those higher up. But Nature delights not in cavities or vacuums, but follows throughout her works a simi-

* It is surprising, that so excellent an anatomist as Bourgelat should regard this duplication of the skin as a defect, 'Les excroissances contre nature que 'l'on nomme barbes ou barbillions.' It may be remarked, Nature, in the usual course of her proceedings, forms nothing useless or originally defective. With regard to these, they are of evident and great utility in confining the motions of the tongue, and assisting the ligamentary connexion. In old books of farriery, we always meet with the terms paps and barbs under the diseases of the mouth. These, by time, became confounded, so that one term was used for the other. But it should appear that *barbs* originally expressed this duplicature of the membranes of these parts, and which, in inflammation of the mouth, becoming enlarged, were regarded as the cause of the disease, and hence extirpated. The *paps* were originally intended to express the little mammillary terminations of the salivary ducts, which are situated near the barbs. These the ignorance of the times regarded as excrescences also, and directed them to be cut close away. In the first instance, the excising of the barbs, or of that duplicature of the skin I have described, might not be attended with any danger; but the removal of the paps would very probably obstruct the salivary duct; this must produce inflammation in the gland, which, if it proceeded to suppuration, would form a very troublesome wound, and finally injure and blemish the animal. From an ignorance of the anatomy of the horse, these errors not only arose, but were disseminated. Bracken, falling into the same, speaks of these excrescences under the tongue, and recommends their removal. Bartlet, who was still less acquainted with the structure of this animal, copied him; and from these sources these gross errors have continued to be handed down in all the treatises on this subject to the present day. Persons who profess to instruct in any art, should be doubly careful how they receive the errors of others, and propagate them blindly. Not only is much mischief done to the veterinary practice by promulgating these erroneous principles, but neighbouring nations (who have no other means of judging of our improvements but by our public works) form a very disadvantageous opinion of the state of the art among us. In a late voluminous publication, we see '*barbs* or *paps* are small excrescences under the tongue: when preternaturally enlarged, cut them close.'—*J. Lawrence*, vol. ii, p. 490.

litude, and blends her characters into each other; therefore she has given a canine tooth in this place, and which appears designed to break the vacancy, as well as to keep up this connexion between the carnivorous and herbivorous tribes. Man, ever alert to take advantage of what nature puts into his reach, turns this space to the utmost use; and that which to the anatomist forms a part but little worthy of attention, is, with the riding-master, a subject of the greatest importance. The bars form those parts upon which the bit of the bridle rests, whereby we insure the obedience of the animal; they are continuations of the alveolary edges, more or less rounded in different subjects, and are furnished with the gums, which are likewise more or less thick in some than others. Though, as we have said, the gums are not very sensible, yet they are sufficiently so to feel very forcibly the strong pressure of the bit of the bridle upon this part; and, independent of which, the skin of the branches of the jaw above the chin is very sensible, which being pressed by the curb against the sharp edges of the jaw bone, farther insures the obedience of the animal: but horsemen pay less regard to this part (though it is the most sensible) than to the bars, because the pressure on the chin by the curb produces but one action, that of stopping progression; whereas, by means of the sensibility of the bars, various actions are brought about, and the horse is directed to either side: as, therefore, this is more or less sensible, so is the horse said to have a better or a worse mouth. When the alveolary edges of the posterior jaw are very sharp, the pressure of the gums upon them, by means of the bit, must be painful, and this must be much increased in those gums naturally very sensible; and, in this case, a horse may have too tender a mouth. On the contrary, when the bony part of the bars is round and smooth, the gums must suffer less from pressure; and this in a still greater degree, if there be superadded to it a natural insensibility of the gums, which then constitutes a hard mouth. It is supposed, that putting a horse on a champing bit increases the sensibility of the mouth, for, by masticating upon the bit, the bars are rendered more sensible; but if this custom be too long continued, in the end, the constant friction and pressure will harden the gums from the cuticular increase; it will likewise wear the teeth. To keep the bars sensible, there should never be, during action, but a momentary pressure upon them; and a kind of play between the mouth and the hand of the rider, and an oscillatory motion of the bridle; by which slight pressure, the obedience of the horse will be obtained; his mind will be occupied upon its proper subject; that is, his attention will be engaged on a progression subjected to the will of his rider, and his mouth, as it is termed, will be kept alive, and always sensible. Hence, it is evident, that the custom of riding hacknies so much with snaffles, in which there is no aid derived from the chin, but the whole pressure laid upon the bars, is founded on wrong principles. Whenever these bridles are used, they should be large; nor should a servant be allowed to water or exercise a horse with a less snaffle than one whose diameter is three quarters of an inch in the part that rests upon the bars.

I have entered into this subject more widely than perhaps may be deemed necessary, and it may be thought foreign to my text; but it is so important, and so practically connected with the description of the part concerned, that I have ventured on this digression.

The *teeth* are parts within the mouth, contained within the alveolary edges of the superior, inferior, and posterior maxillary bones, and which have been particularly described in the Osteology. The *palate* is divided into its arch and its septum. The *arch* is bony and membranous; the membranous structure adheres by its inner surface to the bony palatine arch, formed of the palatine portions of the superior maxillary bones: its outer surface is thrown into very considerable rugæ, or folds, which are more distant from each other, and larger in the inferior part of the arch towards the incisive teeth, than in the superior and farther part of the mouth. The palatine arch appears formed of the common integuments with a dense cellular substance intermixed, and is laterally connected with the membrane of the gums. In colts and young horses, this part is naturally thicker than in old ones: sometimes it becomes so much so as to reverse the palatine arch, making it convex instead of concave; in which cases it is usual, with farriers, to say the horse has the lampas; and the part is commonly cauterized or scarified, putting the horse to unnecessary pain, and not unfrequently a caries of the bone is produced. It is very seldom a local affection, but in most cases arises from a general relaxation of the whole alimentary canal, and of the stomach in particular. (See *Condition*.) The membrane itself, however, may now and then become to a great degree preternaturally enlarged; but it seldom can require such strong means as cauterizing, but will generally give way to astringent applications. (See *Lampas*.) The use of these rugæ is to prevent the falling out of the food from the mouth in the inclined situation of the head: in the human mouth, as the head is held in a less inclined position, they are much less evident, as being but little necessary.

The *velum palati* forms the posterior portion of this arch, and is attached to the palatine edges, and to the maxillary bones; laterally, it appears formed from a continuation of the membranes of the palate and muscular fasciculi. This septum presents an inferior or posterior opening, by which means it divides the mouth from the pharynx, having its superior or anterior portions fixed to the palatine bone, where the arch of the palate ceases; its sides having a lateral attachment, and its centre floating loose within the cavity, like a curtain of division between these parts, but presenting a central opening similar to the arch of a bridge. In the middle of this arch, there is, in the human, a glandular pendulous body termed the uvula, but which in the horse is absent, and is supplied by the velum palati, whose surface is more extensive, and carried lower down, in such manner that only this slight opening we have mentioned appears; and which also is exactly closed up by a cartilage proper to the larynx: so that except when the horse be swallowing, there is no immediate communication between the mouth and the pharynx. The cavities of the nose open into the pharynx; and the larynx opens likewise into the same hollow: as, therefore, the communication between the mouth and pharynx is shut out, it is evident, that the horse cannot breathe by his mouth; and when any air comes by this way, as in coughing, it is only by a convulsive displacement of the velum palati. The œsophagus likewise opens into the pharynx, consequently there is no passage for the food either were it to return: thus, if a horse's stomach was so formed that he could vomit, he would be in danger of being suffocated; for the matter would be forced into the nose, unless the same convulsive effort before noticed should force it into the mouth. But in those animals who can vomit, the velum palati is not so extensive, and they likewise can breathe through the mouth, which the horse is not naturally formed to do.

Though the curtain of the palate cannot be carried forward, but by a very convulsive effort, it is so situated as very easily to be carried back; at least, it can be very considerably elevated by means of its muscles, which are very numerous, and their size and direction such, that they have never been all named (see *Myology*). By means of these muscular fibres, the velum palati becomes elevated, and the masticated bolus passing over the epiglottis presses it down, whereby the opening becomes at once increased, and the cavity of the larynx shut, so that nothing is permitted by this formation to pass from the pharynx to the mouth, but every thing easily from the mouth to the pharynx. There are on each side fleshy pillars, or half arches, formed of muscular fibres, within a duplicature of the common membrane, terminating by one part in the velum palati and pharynx, and by the other in the base of the tongue; by means of which the motions of the velum palati are assisted. It appears probable, that these are particularly useful in bringing about that concordance of action between these parts; for at the same time that the palatine septum is carried back, the larynx is raised, and, with it, the œsophagus; the pharynx is at the same time depressed, the tongue usually contracted, and its base elevated.

The *tongue* is that large fleshy mass which fills up the channel or space between the branches of the posterior jaw, being surrounded by the alveolary border, and extending upwards, so as to adapt itself to the arch of the palate. (See *Plate* III.) Like the other organs of sense, it presents a double formation, although it does not, as in some animals, afford a median line of division. It is extremely moveable, being almost wholly composed of muscular fibres; and is divided into its basis, which is above; its apex or point, which is below; and into its body, which presents an anterior and posterior surface with a right and a left edge. It is connected principally by its base, by means of muscular attachment, and to the os hyoides and posterior maxilla. Its under surface is connected to the parts around by means of a frenum or bridle. It is covered by integumental tunics, which over its anterior surface assume a particular structure, and is studded with conical papillæ and a thick reticular structure of rete mucosum*: this papillary texture pierces the rete mucosum, with a portion of the cuticle over it; while the posterior surface presents a pure covering, and exhibits none of these eminences. On examination, these papillæ appear of different forms: in some animals they are very large, as in the ox, bear, and some others. Between the papillæ are seen follicular openings, from whence the mucus of the tongue is derived. The internal structure of the tongue is almost wholly muscular, and its fibres take almost every direction, with a whitish substance interposed in a transverse direction between its fibres, and which substance is much more considerable near the base. The fibres in the central parts of the organ are placed in various ways, that the motion may be performed on all sides: besides which, there appears a perpendicular plane immediately under the surface, whereby its mass is shortened. Its proper muscles are those between it and the os hyoides, and those between the os hyoides and other parts (see *Myology*.) The blood vessels of this organ are the raninæ and palatine, by which vessels it is furnished with a vascular plexus immediately under the skin. (See *Angiology*.) The nerves are derived from the lingual, or ninth pair, which furnishes the muscular mass; while its exquisite perceptions of taste are principally drawn from a branch of the fifth pair, called the gustatory, whose ramifications are expended on its papillæ and tasting surface. It is an organ of great sympathy, and its extensive nervous connexions favour this sympathetic property. By the ninth pair of nerves it is connected with the larynx and pharynx, as well as by the glosso pharyngeal, which nerve is divided between the tongue and pharynx, and connects these parts in deglutition; while the gustatory unites the actions of the tongue and salivary glands. The associations of these three nerves produce a general consent of action between the tongue, the pharynx, larynx, œsophagus, and

* The rete mucosum is not observed in the human tongue: hence, however black the negro, his tongue is invariably red.

salivary glands. (See *Neurology.*) *For an exemplification of these parts, see Plate* III. The tongue is also a very principal organ in mastication: by its great mobility it carries the food into every direction the most favourable for it to be chewed in; and, finally, passes it to the pharynx.

Sense of Tasting.

Taste appears to be derived from a property in the mouth of fluidifying whatever is received, in which it resembles the sense of smell; for although that exerts its influence in the form of gas, yet moisture is necessary to both, and both operate by their chemical qualities; whereas the matters taken cognizance of by touch, depend on their mechanical properties. The tongue, which is the organ of taste in all vertebrated animals, possesses an exquisite modified sensibility, and in brutes is endowed also with a salutary instinct. In man, civilization, by heightening the intellectual has weakened the instinctive powers, if they ever existed. Taste was given to brutes to regulate their other senses, and thus there are few plants or substances whose application to the tongue produces an agreeable effect, but such as are proper for food. Nature, therefore, stimulates her creatures to take food by a double motive; the pleasure of taste, and the pain of hunger: and for this reason it is, that we find animals will not thrive on some food which is capable of forming nutriment, for they are not stimulated by taste; and a less quantity will damp the calls of hunger than is necessary to fatten. It must, however, be confessed, that the discriminating quality in brutes, with regard to food, is greatly assisted by their sense of smelling.

The Pharynx.

I shall consider and describe as the *pharynx,* all that considerable cavity which is superior and posterior to the mouth, properly so called; and divided from it by the velum palati. It is usual to consider the cavity generally, as the posterior part of the mouth, or hinder mouth; and then to regard the pharynx as a portion of this, whose line of division is imaginary: but as it is evidently one hollow, having the openings of several other cavities and canals within it, I shall consider the whole as pharynx, and which mode will much expedite and facilitate a just knowledge of it, which is the only true intent of anatomy. Within the pharynx, so considered, are seen, the communication with the mouth, the opening of the nasal fossæ by means of the fauces (which are only the upper and anterior portions of this cavity), the membrane covering the eustachian vaults, the cavity of the larynx, and that of the œsophagus. The manner in which the nasal fossæ open into the pharynx is best learned by a reference to Plate III, where their true situation is at once seen. The *eustachian cavities* are shut from immediate communication with the pharynx, by means of their membranous covering: each cavity is placed on one side of the pharynx, immediately behind the base of the skull. (*Vide Plate* III.)

The *larynx,* which is the opening or commencement of the trachea, is placed in the posterior part of the pharynx, and forms a kind of cartilaginous box, which is composed principally of five pieces, so situated between the branches of the os hyoides, and so connected with this bone, as to have very small lateral motion; but an extensive one above, downwards, forwards, and backwards, as the situation of the parts may vary. These cartilages are, the thyroid, the cricoid, the two arytenoid, and the epiglottis. (*Vide Plate* III.) The *thyroid cartilage* is the most considerable, and forms a kind of half circle, having a longitudinal convexity on the anterior part, and being concave within; it is united to the lateral and middle parts of the cricoid cartilage; superiorly it is received between the branches of the os hyoides, to which it is attached by a ligament within it; the epiglottis being situated as it were at its anterior part. The *cricoid* cartilage approaches in figure to a thick ring, and is received, in some measure, within the thyroid, and is united to it by a ligament: it articulates above with the arytenoid, and below with the thyroid, as already described, with its base united to the upper part of the trachea. The *arytenoid* are two small similar cartilages, situated posteriorly above the cricoid, and rather within the cavity of the larynx, uniting together at the beginning of the glottis: their concave inferior surface receives the superior convex surface of the cricoid cartilage, and the superior extremity forms a kind of point curved backwards. The *epiglottis* (*vide Pl.* III) is a very elastic tongue-like body, situated and attached to the anterior portion of the thyroid by a strong ligament. Its internal surface is concave; its external is slightly convex, and attached to the base of the tongue by some muscular fibres; it ends in a point, which is curved forward. This cartilage is of the utmost importance to the animal; it exactly fills up the floating arch of the velum palati, thereby shutting the cavity of the mouth, and making the animal breathe through his nose. As the bolus passes forwards, this cartilage is forced down, and then exactly fits the opening of the glottis, and by this means the entrance of any thing within the trachea is prevented. As soon as the bolus has passed, the epiglottis by its elasticity, and, perhaps, assisted by muscular fibres, returns to its situation. And here we must, in a particular manner, admire the wisdom of its formation: had it been ligamentary, and influenced in its actions by muscles only, it would continually have endangered the animal; for numerous diseases might affect the muscular energy: but the cartilaginous elasticity is never lost till the body falls into a state of decomposition and decay. The *glottis* is nothing more than the oval opening into the box, formed by means of the cartilages, and their numerous connecting membranes and ligaments.

The larynx gives insertion to a great number of muscles, and its motions are consequently much varied; some of these muscles operate on the whole of it as a body, and have their attachments in other parts; some operate only on particular cartilages, but are wholly inserted in the larynx: the sterno thyroidæi draws the opening downwards after it has been raised in deglutition; it is elevated in this action by the hyo thyroidæi. The crico thyroidæi, crico arytenoidæi lateralis and posterioris, thyro arytenoidæi, hyo epiglottici, are all muscles that act upon the different cartilages; by which means the cavity of the larynx is altered in its figure and dimensions, and the sounds of the voice are thus variously modulated. The membrane lining this part appears a continuation of that of the pharynx, and is very vascular and sensible, being continually kept moist by its mucous secretion. The *thyroid glands* are situated one on each side of the cricoid cartilage. In the human, the thyroid gland is one body, situated at the anterior convex side of the larynx; here it forms two oval glandular bodies, but whose use in either subject is unknown. The blood vessels of both pharynx and larynx are the laryngeal, which arise from the carotids and jugulars. Their nerves are, first, the recurrents; they are next furnished and connected by the glosso pharyngeal, and by rami from the fifth, seventh, and others, uniting the surfaces of these great and important cavities into a sympathetic action with all the parts around. (See *Neurology*.)

Uses of the larynx.—This part answers two very principal purposes in the economy: it is the organ by which air is received into the lungs; it is likewise the organ of the voice, and by which sound is produced; hence, if the recurrent nerves, going to this part, be divided, the voice is entirely lost. The cartilages of the larynx are moveable one upon the other, and are furnished with muscular cords named *cordæ vocales*, which tighten or relax this sonorous box, which being acted on by aerial vibrations within, the undulations are transmitted to the ear. The peculiarities of the voice in different quadrupeds appear to consist principally in the number and form of the laryngeal sacs. There are usually three of these, one of which appears under the vault formed by the anterior boundary of the thyroid cartilage, having its aperture near the root of the epiglottis. The other two are oblong sinuses contained between the lateral parietes of the glottis and the thyroid cartilage, and are covered in a great measure by the arytenoidei muscles. In the horse these lateral sacs are very long and wide, and are not unlike the usual ventricles of the glottis. The aperture of the outer cavity is very large in the horse: in the ass the opening into each of the three sacs is a small hole, and the anterior sac forms a bag-like cavity. In the mule these organs differ, but their anatomical formation is in general blended between the horse and ass. The various sounds emitted by animals are named arbitrarily, without reference to the noise heard: thus we say the horse neighs, and the ass brays. Neighing appears produced by expirations, as are most of the tones of voice from the horse. The vibrations produced by the resonnance of different sized cavities, assisted by the tremors of the cartilages of the nostrils, produce the compounded sounds which are emitted. *Knuckering,* as it is termed, is only a lesser neigh, with shorter, deeper, and less forcible tones, and expresses affection and joy. The horse has one acute sound, produced by the act of inspiration, which usually expresses either play or lust; but in most other instances, sound in the horse is produced from expirations; nor does it appear that the tongue or teeth are much concerned in the modulations of his voice; but in dogs they are very much so. In the ass, the principal sounds are those of *braying,* and perhaps he differs in no respect so much from the horse as in the sounds he produces; and this is another very strong proof, that an ass is not a horse degenerated, as has been by some supposed. Braying appears to be produced through the mouth by a convulsive displacement of the velum palati, assisted by the vibrations occasioned by the extent of the laryngeal sacs, and by their being so much separated from the cavity of the larynx. It is effected by alternate inspirations and expirations; the inspirations forming half tones, and the lengthened notes being formed of expirations. The *lowing* of oxen is likewise performed through the mouth; and the *bleating* of sheep also: hence it would appear, that the mouth is better adapted to convey sound than the nose; or at least it produces more variety in tones, though the passage is not so direct. *Barking* is formed of short-continued expirations, with the jaws very slightly separated, succeeded by a quick and forcible expiration, the mouth being alternately opened and shut. A dog produces more tones than most quadrupeds; his *howl* consists of a great variety of notes, but are all, except the whine, formed with the mouth open. *Snarling* is effected by a tremor of the velum palati, and can be brought about equally by expiration or inspiration. The *mewing* of a cat is produced by expiration, both through the nose and mouth; beginning with the consonant *m,* and continued by passing the air through the nose, and then following it with a more steady expiration through the open mouth, the shutting of which produces the final expression. The *grunting* of hogs appears generally composed of expirations, and can be effected either through the mouth or nose, and consists in a convulsive tremor of the curtain of the palate during the expiration: their cry of distress is effected through the mouth by expirations: thus persons, when killing pigs, usually tie the mouth, to drown or lessen the noise.

Deglutition, or the uses of the mouth and pharynx.—Animals have organs wisely adapted to their wants. The reception of food into the stomach is a process of great importance, and managed with considerable art. The natural food of the horse is grain or herbage, usually collected near the ground. When a horse grazes, he crops the grass with his incisive teeth, first placing by his lips a tuft between them, when, elevating his chin, the sharp edges of the under ones become applied to the grass, and cut it through; were it not cut, instead of torn, the horse would be under the necessity of taking up roots and all: therefore, it will be found, the prominent edges of these teeth are all wisely adapted to this process. In the ox and sheep, who have no upper nippers, they wrap a tuft of grass round with their tongue, and then apply it to the under incisive, by which it is cut off; therefore, they are obliged always to carry the chin forward in collecting their grass. When a quantity of grass, or herbage, is thus gained, it is carried by the tongue and molar muscles to the upper part of the mouth, to encounter the action of the grinders, and to be mixed with saliva during the process; for which the broad flat surfaces of their teeth are admirably adapted. The matter is carried from side to side, so as to be placed in the most favourable direction for perfect mastication, by means of the tongue and molar muscles. During this process, it continues to be mixed with the salivary fluid, from the parotid, maxillary, and sublingual glands, which pour out their secretion by the pressure of the surrounding muscles, in greater quantity than usual: and for which reason, that is, to be subjected to this pressure, these glands are so placed as to be near the motion of the muscles used in mastication: but this is not the only stimulus to them; they are acted upon by the stimulus of the mind likewise; for we find if victuals be placed before a hungry dog, just without his reach, his jaws will pour out saliva in great plenty.

The mass having been thus completely masticated, is, by the tongue, carried backwards, and upwards into the pharynx, and, during its passage, the epiglottis becomes pressed down, so as exactly to cover the glottis, or opening of the larynx, and the velum palati is at the same time carried backwards so as to close the nasal fossæ. The mouth is kept shut during this action, that the muscles may find a fixed point; the pharynx then first sinks to receive the bolus pushed into it by the contraction of the tongue, whereby its base becomes elevated and enlarged, and completely stops up the opening towards the mouth, it also keeps the larynx closed; the pharynx then receiving it, first sinks, as we have said, to permit its entry, and then rises, with the funnel-like extremity of the œsophagus open, into which the bolus is forced, and, by its muscular powers, it is moulded into a proper shape. The action after this becomes involuntary, the mass being pushed forward through the œsophagus by means of its muscular structure, as will be explained hereafter. The gullet has this power independent of the gravity of the substance; for grazing animals always swallow against the gravity of the aliment. But until it has entered the common canal of the œsophagus, without the assistance of the tongue, deglutition cannot be performed. A woman, who had lost this organ, was forced always to place the food, by means of a spoon, or fork, quite into the pharynx, or she could not swallow: so animals, who have been deprived of the tongue, elevate the head to let the substance gravitate: hence becomes evident the folly of those farriers, who attempt to give a ball, yet the whole time confine the tongue till they suppose it is swallowed; for, by preventing this organ from being raised at its base, the ball cannot be carried back, but either remains stationary or gets into some of the interstices of the mouth.

The *glands* of the head are folliculose, mucous, and salivary, with the sebaceous ones of the ears. The salivary glands secrete the fluid we call saliva, and are three to each side of the head, the parotid, the submaxillary, and the sublingual. The *parotid* is a considerable body, situated in a hollow beginning at the base of the ear anteriorly from the zygomatic arch (see *Plate* IV), extending as low down as the angle of the lower jaw. Inferiorly, it presents a triangular process, which extends up on the upper branch of the jugular, while another portion fills up the triangular space between the upper and lower branches of this vein. It is composed of numerous lobuli, enveloped by cellular membrane: each of these lobes presents several tubuli, which finally unite into one common excretory trunk, which traverses the anterior edge of the gland, passing along the tuberosity of the jaw, within the inner surface of which it proceeds to the extremity of the tuberous ridge, when it crosses over the posterior edge of the jaw, in company with the maxillary artery and vein, and pierces the muscles and integuments of the mouth about the second molar tooth. It is an inflammation and suppuration of either of these, or of the submaxillary glands, which forms the complaint called strangles. Farriers call these glands vives, and any affection of them they name vives also; and a number of gross prejudices prevail among them relative thereto. From the structure detailed, it will be apparent that when an artificial opening is necessary in the parotid gland, great caution is requisite to select a proper part for the operation, which it is evident should be distant from the course of the excretory duct, or a fistulous opening may be formed, and the animal robbed of the saliva of that side.

The *maxillary* is a considerable gland, situated within the branch of the posterior jaw, its upper part being near the condyloid process of that bone, and its lower pointed extremity occupying the angle, or rather a little beyond it; superiorly, being just within, and under the parotid glands. Its duct passes under the mylo-hyoideus muscle, and under the tendon of the digastric, and penetrates the membrane of the mouth, about an inch and a half from the lower nippers, by an orifice proper to each gland, which projects up into a nipple-like rising. (*Vide Plate* III, *Fig.* 2, *n n.*) In inflammations of the mouth, it is common, with ignorant farriers, to mistake these for injurious and foreign bodies, and to cut them off, whereby they usually occasion a very serious complaint. Mr. J. Lawrence, in his publication, among other gross errors, recommends cutting the *barbs*, or *paps*, close.

The *sublingual gland* is smaller than the parotid, being placed along the under part of the tongue, where its form is easily detected. Its duct penetrates the mouth by the side of the frænum. By these ducts saliva is conveyed into the mouth, being acted on by pressure in mastication, as well as by sympathetic influence and consent of parts.

The *maxillary lymphatic glands* are situated at the superior part of the branches of the posterior jaw under the skin: they pour their lymph into the cervical glands. La Fosse mistakes these, and which has thrown him into great error in his description of the glanders. The *sublingual glands* are situated lower than these: their excretory duct penetrates the mouth at the lateral inferior part. The *labial glands* are placed under the common membrane of the mouth, on the inner surface of the lips, and are small folliculose bodies. The *molar glands* are on each side of the mouth, near the alveolar edge; and are also small bodies, whose excretory duct opens near the last molar teeth. The *folliculose* and *mucous glands* are distributed over these parts, as already noticed; and from whence it will appear that the whole of the membrane of the nose, mouth, pharynx, and larynx, are secreting surfaces, and constantly form a mucus, which defends these parts from the external atmosphere, and serves to keep up the sensibility of their surfaces. When this membrane becomes inflamed, it forms catarrh, in which case this secretion is at first increased and thinner, but at last degenerates into a thicker and more purulent state. The salivary glands secrete the fluid we call the saliva, whose use appears to be that of diluting the food, and fitting it for its maceration.

Description of Plate III.

This Plate represents a section of the head, as far as the second cervical vertebra. The section was not carried exactly through the centre, but was inclined to the right side; consequently leaving the left portion rather the largest, by which means the septa dividing the parts are preserved.

Figure the First

Presents the left portion of the section, in which the cartilaginous partition of the two nasal cavities is entire, with part of the falx or septum dividing the two lobes of the brain likewise. The œsophagus, as inclining naturally rather to the left side, appears, therefore, whole in this section, and this influenced the making the division with the larger half or portion to the left.

a, The cerebrum; *b*, the cerebellum, with its arborescent appearance; *c c*, the medulla oblongata. The anterior *c*, shews its origin at the base of the cerebrum and cerebellum: the posterior *c*, depicts the spinal marrow, which is the continuation of the medulla, passing out at the great foramen in the occipital bone; *d*, the eustachian cavity, being the termination of the eustachian tube: it was covered by a membranous septum, which is removed to shew the cavity more completely; the letter *d*, is immediately upon a part of the os hyoides: the two vessels that run under and across it, are the carotid artery and jugular vein: posterior to it, is a muscle of the os hyoides; next to it, the lingual nerve; and behind these, are branches of the external carotid. The edges of this cavity form part of the pharynx, and are attached to the posterior portion of the occipital: to its lower edge the muscular fibres of the œsophagus are attached; and to its upper and posterior part, the muscles of the pharynx; *e*, the frontal sinuses divided by the partition, part of which is broken off, to shew the left of these cavities; *f*, the ethmoidal sinuses; *g*, the sphenoidal sinus; *h*, the cartilaginous partition of the nose; *i*, the vomer implanted below, into the groove of the palatine bones, and above, fixed into the septum of the nose; *k*, the cartilaginous substance immediately over the palatine bones, assisting in the division of these cavities and their formation; *l*, the palate, or roof of the mouth, with its folds or rugæ; *m*, shews the section of the posterior jaw, at the symphysis of the chin: above and below the muscular substance of the lips is seen, with the skin as a line over it; *n*, the section of the tongue, with its fibrous appearance, or the intermixture of tendinous fibres towards the root; *o*, its outer covering formed of epidermis, or skin, expressed by a white line around its edge: it is seen rough, and its roughness increases as it advances towards its base; *p*, is intended to shew the velum palati, or curtain of the palati, attached to the edge of the palate bone, and extending down in front of the epiglottis, forming a true valve to these parts, and demonstrating the reason why a horse breathes through his nose; *q*, the epiglottis, or cartilage, that covers the cavity of the larynx in deglutition; *r*, the larynx, or cavity, from whence the trachea commences; *t t*, the trachea, or windpipe, cut down the middle, composed of cartilaginous portions, being nearly but not perfectly annular; *u u*, the pharynx, which is the cavity of the hinder mouth, divided by the curtain of the palate: the pharynx receives the left nostril at the anterior letter *u*; *v*, the internal coat of the œsophagus thrown into folds, which is a continuation of the cuticle, lining the tongue and mouth, and the farther continuation of which forms the cuticular, or insensible portion of the stomach; *x*, the muscular coat of the œsophagus, which arises from the edges of the membranous cavity; *y*, the cervical ligament, attached to the occipital bone, escaping the first vertebra, and attached strongly to all the rest; *z*, the cavity for the enlargement of the œsophagus in swallowing.

Figure the Second

Represents the right half of the head, with the velum palati and the membranous pharynx removed, as well as the brain and spinal marrow; *a*, the cavity for the lodgment of the cerebrum, with its risings and depressions marked; *b*, the cavity within the occipital, for the lodgement of the cerebellum; *c*, marks the passage through the occipital foramen and atlas; *d*, the frontal sinuses exposed, the bony septum dividing the right from the left remaining with the right portion, but within are seen bony billars supporting these sinuses; *e*, the superior turbinated bone forming the upper cornet of the nose; *f*, the inferior turbinated bone forming the under or posterior cornet of the nose; *g*, the ethmoidal sinuses, which in their natural state are covered with a thick brownish substance, firmer than mucus, and adhering closely to the bone; *h*, the sphenoidal sinuses; *i i*, the os hyoides; the superior letter expresses its larger branches, as the lower does its lesser: the bottom portion is its fork, and embraces the larynx; *k*, a branch of the carotid going to the base of the skull: next to it is seen part of the jugular returning the blood from the sinuses: the substance seen crossing these is the lingual nerve; *l*, the carotid artery forming its divisions; *m m m*, the digastric muscle, with its two fleshy attachments and intermediate tendon; *n n n*, the right maxillary gland: the posterior letter shews its body which lies within, and under the parotid, as seen in Plate IV: the middle *n*, shews its duct passing at the posterior, and under part of the tongue; and the anterior letter shews the termination of this duct in the mouth under the tongue, a little distance from the front teeth: each duct terminates by a little mammillary process, which the farriers call the paps; *o*, the branch of the carotid artery, that passes over the jaw, and forms the most convenient part for feeling the pulse, the fingers being applied exactly where the letter is placed; *p*, the left half of the tongue; *q*, its root dissected from its attachment to the os hyoides; *r*, a probe shewing the passage of some of the vessels of the brain; *s*, the optic foramen of the sphenoid bone; *t*, another foramen permitting the passage of the cerebral vessels; *v v*, the most anterior of these, shews the exit of the olfactory nerves, and the posterior the transverse septum, dividing the cerebrum from the cerebellum; *w*, is intended to shew the retraction of the skin of the ear, with the concha, or cartilage of that organ underneath, as it appears in the operation of cropping; *x x*, the eustachian cavity removed, and the edges composing it, with the pharynx likewise, and extended as far as the velum palati, and the end of the palatine bones; *y*, the two tables of the skull, with the intermediate cancelli, or diploe; *z*, the pericranium lining the skull.

Of the Neck in general.

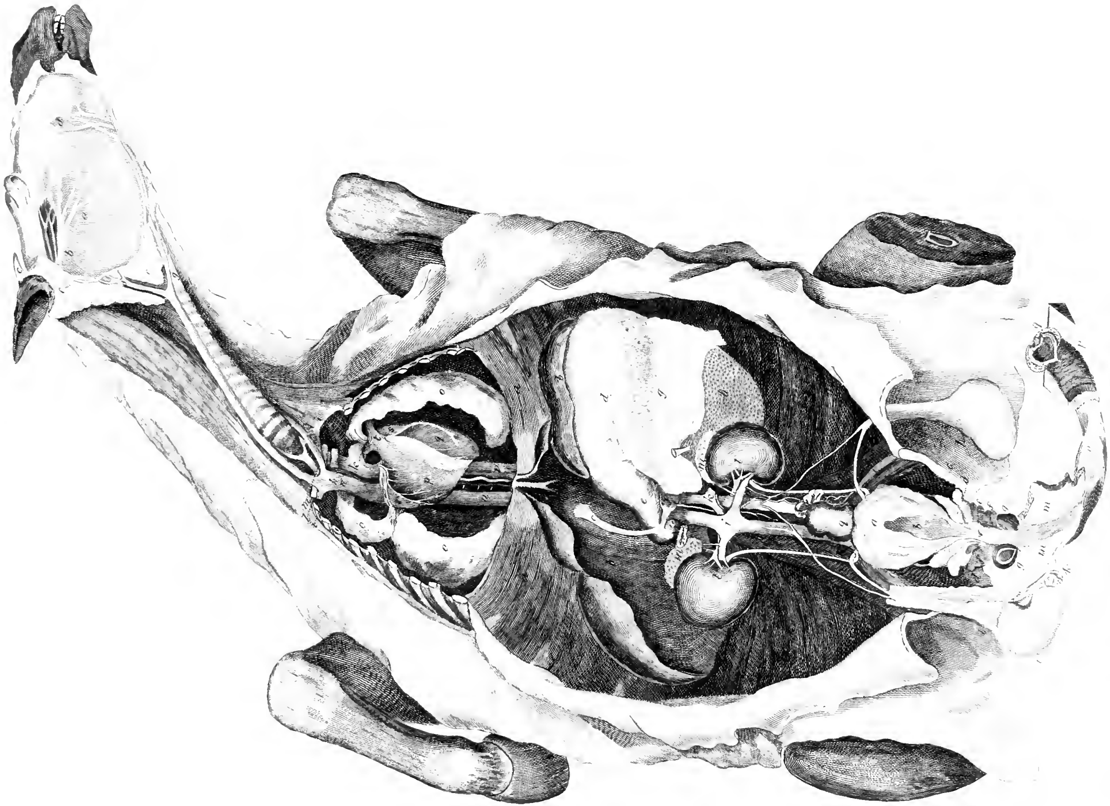
The neck of the horse is a very considerable part, assisting him in progression, by forming a counterpoise to the great weight and extent of his hinder parts: it is likewise useful in enabling him to reach his food from the ground. This part may be divided into external and internal parts; the first of which are, the mane, the general hair, the common integuments, the cervical ligaments, the muscles, the jugular veins, with the cutaneous vessels and nerves. The more internal parts may be considered to be the cervical vertebræ, the spinal marrow and nerves, the vertebral vessels, the carotid arteries, the glands and proper nerves, with the trachea and œsophagus. The neck extends from the upper part of the head between the ears above; and below from the termination of the channel, and the implanting of the lower jaw; and terminates superiorly at the withers, and below at the breast: speaking anatomically, it comprehends all that space between the occipital bone above, and the angle of the posterior jaw below, to the spinous processes of the first dorsal vertebræ above, and to near the articulation of the humerus with the scapula below. The common integuments of the neck are similar to those of the other parts of the body.

Parts of the Neck.

The *cervical ligament* is a very strong substance, placed between the head and the body, as a support to the head. The muscles of the neck are very strong; but muscles, if constantly kept in action, tire; Nature has, therefore, given a substance that has great strength, without being liable to fatigue, by which the head is constantly kept supported. This substance differs from ligament, in some respects, as it is elastic, by which the motions of the head are much accelerated. It is strongly attached, by its anterior extremity, to the posterior part of the occipital bone; passing over the first cervical vertebra, without attaching itself to it, but being intimately connected with the spinous processes of the second, third, and fourth; the stronger portion of it here passes forwards to reach the spinous processes of the dorsal, but it sends down a kind of double lamen of ligament, to unite with the rest of the cervical bones. (*Vide Plate* III.) The *muscles of the neck* are all described in the Myology, to which we refer the reader; it is sufficent to say, they are numerous and extensive, and most of them have some attachment to the cervical ligament. In surgical operations upon this part, it becomes necessary to keep in mind, that the fibres of these muscles run almost all of them nearly longitudinally. The *jugular veins* run one on each side of the neck superficially, on the outside of the trachea, towards the lower parts of the throat; a few inches before they reach the angle of the posterior jaw, each divides into two principal branches. (*Vide Plate* III *and* IV.) The *cutaneous vessels and nerves* are branches given off from the carotid and vertebral arteries, returning their blood by the jugular and vertebral veins. The *nerves* are from the cervical branches and the intercostals.

The *internal parts of the neck* are, first, the seven cervical vertebræ, which have been fully described in the Osteology; they run down this part imbedded in muscles: the first three are situated towards its superior part of it, the remainder gradually gain the middle portion; and the space between is filled up by the cervical ligament and muscles. The *spinal marrow* descends along the great cavity within the substance of these vertebræ, and the cervical nerves are given out between the notches formed by the junction of each of their bodies. The *vertebral vessels* pass through a foramen in their transverse processes, except of the last, in which one the vessel passes under the process. The *carotid arteries* extend up under the jugular, just above the trachea, very near the œsophagus, and near to it run up the par vagum and recurvent nerves. The intercostal nerve likewise passes down within the neck. (*Vide Plate* III, *b. Fig.* 2.) The *internal cavity:* There is internally above, near to where the œsophagus is placed, a cavity formed, which has seldom been noticed; but is nothing more than a species of interval left for the purpose of allowing the œsophagus to distend itself in the act of deglutition. (*Vide z. Fig.* 1, *Plate* III.) The *trachea, aspera arteria*, or *windpipe*, is a large canal arising from the cricoid cartilage of the larynx, and which extends down the anterior part of the neck superficially for some distance; from whence it passes into the thorax, between the duplicatures of the mediastinum: it is composed of annular cartilages, which taper from their front into mere slips, unattached except by the tracheal membrane. These rings are placed one above another, and connected by their edges to the edges of those below, by strong ligaments; by means of which structure the trachea is perfectly flexible, and yet it is always kept open: externally it is united to the surrounding parts by cellular substances, and on the inside it is lined by a very vascular mucous membrane, the secretion of which defends it against the effects of the cold air. It is furnished with vessels from the carotids and jugulars, and with nerves from the eighth pair. Being continued down into the chest, to about the third or fourth dorsal vertebra, it divides into two branches, which are called bronchiæ, the principal divisions of which form segments of circles with an intervening ligament, but which soon become annular; and, as they proceed, they become less and less in diameter, so that they can, in the collapse of the lungs, easily pass one within the other. They will be more fully treated of hereafter. (*Vide t t. Fig.* 1, *Plate* III.)

The *œsophagus.*—The pharynx, which we have lately described, is a funnel-like cavity, ending in a tube, partly membranous and partly muscular, called the œsophagus. Its course from the pharynx is before the cervical vertebræ, and behind the trachea, between the carotid arteries; inclining a little to the left side, it penetrates the chest between the layers of the mediastinum, and continues in a similar direction along the dorsal vertebræ, passing through an opening in the diaphragm, and at length terminates in the stomach. Its coats are, first, a slight and cellular one, which it retains while in the neck, but which in the chest gives place to a covering from the duplicature of the mediastinum. Its second coat is muscular, and made up of several strata of external, longitudinal, and internal fibres, which have a spiral direction. The inner coat is cuticular, and but loosely connected with the muscular: for as the elastic powers of this coat are but small, and the distention of the muscular coat considerable in the act of swallowing; so



this inner tunic is wrinkled into folds in a state of rest; whereby, when the muscular fibres expand, this part can open, so as to allow the passage of the food, and yet prevent the too great expansion of the tube; this cuticular coat is continued into the stomach, over one half of which it is expanded. The want of elasticity in this inner tunic, and its looseness of connexion, are well shewn by a transverse section of the tube when the muscular recedes from the cuticular portion. (*Vide x, x, y. Fig.* 1, *Plate* III.)

The Thorax in General.

The second great cavity of the body is termed *thorax* or *chest*. It is bounded anteriorly by the vessels filling up the opening between the two first ribs; posteriorly by the diaphragm; and laterally by the ribs; above by the vertebræ, and below by the sternum. Its parts are reckoned external and internal. The external parts are, the integuments, muscles, and bones. The internal are, the pleuræ and mediastinum, the thymus gland, lungs, heart, vessels, and nerves, with the diaphragm. The integuments are common to those of other parts. The muscles we have treated of in the Myology; and the bones are formed of the vertebræ, ribs, and sternum, which have been likewise explained.

Description of Plate IV.

Represents the viscera of the chest and belly of a horse, and such other parts as come readily into view, when the subject is laid on its back; and elevated before, to meet the sight.

The skin is raised and thrown back; the cutaneous muscle is removed from the neck, and the cutaneous muscles of the face also, by which the jugular vein, the vessels of the face, and the parotid duct, are brought into sight. The attachment of part of the masseter muscle is removed likewise, to shew the course of the temporal artery and vein, which has been done to demonstrate the error that has arisen in the practice of some veterinarians, who, mistaking this branch as the source from whence the eye is furnished, have directed its division in inflammations of that organ: when from this view it will appear that such practice is useless, as this ramus, called temporal, is wholly given to the masseter muscle.

In the chest the sternum has been removed, with the pericardium, mediastinum, and pleura; by which means, the lungs, heart, and principal vessels, are brought into view, as well as the course of the thoracic duct. In the abdomen, a section is made through its whole length, and the symphysis pubis divided to shew the contents of the pelvis. It is needless to remark, it is a male subject, and of that kind termed a whole horse; that is, it is an uncut animal, with the testicles perfect. A male subject was chosen for this view, and the parts of the horse purposely selected in preference to those of the mare, as being of more consequence to the practice of the veterinarian. The intestines have been removed, dividing them below the entrance of the biliary and pancreatic ducts; and about a foot before the termination of the rectum. These intestines appear in another view; and which are the only parts removed, the remaining viscera appearing in their natural situation: the stomach only is slightly distended to give an accurate idea of its form, but not to its full extent, that the neighbouring parts might not be hid. As the parts described are extensive, and the references numerous, so it is necessary to premise, that they will be referred to in the following order, and to which the letters will correspond: Parts of the head, neck, and chest—Contents of the abdomen—Organs of generation.

Parts of the Head, Neck, and Chest.

a, the masseter muscle, upon the upper part of which is seen spread a branch of the fifth pair of nerves; above, its attachment to the spine of the molar and maxillary bones has been raised to bring *b*, the temporal artery and vein, into view, which are seen above the nerve, and are distributed wholly to the masseter, but contribute nothing to the support of the eye; *c*, the anterior cartilage of the ear; *d*, the maxillary artery, the maxillary vein, and the duct of the parotid gland. The most anterior, or vessel nearest the mouth, is the external maxillary artery, which is that branch of the carotid seen passing over the jaw at *o*, Fig. 2, Plate III, and which forms the most convenient part for feeling the pulse of the horse. The middle vessel is the parotid duct, piercing the molar muscles, and entering the mouth above the second molar tooth, or second upper grinder. The innermost of these vessels crossing the last, is the external maxillary vein, which receives by one branch the blood of another artery of the masseter; by a second, the blood of the temporal artery; and by a third, that of the nasal arteries; *e*, *e*, the upper and lower portions of the parotid gland: its duct is pointed to by the letter, and always proceeds in front of the gland over the inferior part of the lower jaw, to terminate in the mouth; *f*, the superior division of the jugular; *g*, the inferior division of it, which forms the external maxillary vein. The junction of these two principal branches of this vein forms the trunk of the right jugular, which unites with the left, to enter the anterior cava; *h*, the anterior vena cava formed of these, with the axillaries; *k*, the aorta with its division into anterior and posterior; the anterior goes upwards and forwards, and the posterior becomes lost in the view, behind the heart; *l*, *l*, the axillary arteries; *m*, the united trunk of the carotids arising from the right axillary artery, and dividing into the right and left carotids; *n*, the entrance of the thoracic duct into the left jugular; *o*, *o*, *o*, the lobes of the lungs: on the right side is seen a small lobe with a larger one; the lesser lobules do not appear; *p*, the right or anterior ventricle; *q*, the left or posterior ventricle, the portion between is the fat bisecting it; *r*, the right auricle, from which the two vena cavas arise; *ſ*, the left auricle; *t*, the pulmonary artery, dividing into a right and left; the left is seen to pass under the posterior division of the aorta; at this part is situated the membranous canal or communication between these vessels, called canalis arteriosus, which is open in the fœtus, but shut in the adult; *u*, the posterior cava; *v*, the posterior aorta; between these are seen, to the right, the vena azygos, and, to the left, the thoracic duct.

Viscera of the Abdomen.

a, *a*, the diaphragm. The middle and lighter portion, to which the ligament of the liver is attached, is the tendinous part; and the light portions round the circumference are likewise tendinous intersections; *b*, *b*, the lobes of the liver; *c*, the biliary duct arising at once from the liver, without any gall bladder as in other animals; *d*, the stomach with the omentum attached, and the vessels ramifying on it; *e*, its pyloric orifice ending in the duodenum, into which are seen the biliary and pancreatic ducts entering; *f*, the pancreas, the remaining portion lies under the omentum, *g*. From this view it will be seen that the omentum in the horse is small to what it is in the dog and many other animals; it is attached to the stomach along its inferior and posterior curvature, and a portion is kept up by a pin stuck into the spleen to shew that viscus; *h*, the spleen with its granulated appearance; *i*, the posterior cava forming the emulgent veins; *k*, the posterior aorta giving off the anterior mesenteric trunk, to which the united trunk of the lacteals is attached to gain the receptaculum chyli; but neither does the anterior mesenteric always present itself in this situation, nor do the united trunks of the lacteals always accompany it. Immediately beyond are seen the small emulgent arterial trunks given off: the emulgent artery and vein furnish the renal vessels; *l*, *l*, the right and left kidney with the emulgent artery and vein, ramifying into each. The left is seen lower than the right, being pressed down by the spleen; *m*, *m*, the glandulæ renales receiving their vessels from the emulgents; *n*, *n*, the ureters seen passing out from the pelvis of the kidneys, and in their course crossing the vassa deferentia; *o*, *o*, the spermatic vessels formed of an artery and vein each: the left spermatic vein is seen arising from the emulgent vein of that side, by which means it avoids the distance it would otherwise be forced to travel by arising from the cava, which is situated to the right of the spine; *p*, *p*, the lymphatic vessels bringing the lymph from the lower extremities to pour it into the receptaculum chyli; on the left side they proceed up from the pelvis in company with the iliac vessels and the aorta; *q*, part of the rectum lying immediately behind the bladder; *r*, *r*, the division of the aorta into external and internal iliacs, with the like division of the cava.

The Organs of Generation.

a, the bladder cut open to shew the termination of the ureters within it at *b*. The ureters are seen proceeding from the testicles and crossing the spermatic rope; *c*, *c*, the enlargement of the vasa deferentia before their termination into the urethra alongside of the opening of the vesiculæ seminales; *d*, *d*, the vesiculæ seminales; the right is cut open to shew its termination within the urethra alongside of the vasa deferentia; but in such a manner do the ducts of these two parts run alongside, and terminate parallel to each other, that there is no communication between the testicles and them; nor can they ever be intended as a reservoir to the semen, as has been asserted; *e*, marks the termination of the vasa deferentia, and the vesiculæ seminales opening into the same part of the urethra by two little orifices. Immediately behind these, lying along the neck of the bladder, about the size of a goose quill, and about two or three inches long, is what the French call a middle vesicle. It terminates usually by one of the openings common to one or the other lateral vesicle; *f*, *f*, two glandular bodies that correspond in situation, but not in structure, to the human prostates; *g*, *g*, the two antiprostatæ or Cowper's glands covered with the accelerator muscles: the right is cut open to shew its cavity. The little ducts of these glands, called lacunæ, are seen within the urethra; *h*, *h*, the left testicle, with its rope coming through the ring of the oblique muscle, and covered with its vaginal coat and the cremaster muscle, which descends along its inner side, and is expanded over its upper part; *i*, the right testicle removed from its passage through the abdominal ring, and its vaginal coat laid open; the body is seen with its vessels ramifying on it, being alternately straight and waved upon its albugineous coat; *k*, that part of the testicle called its appendix or epididymis, communicating with the main body by the tubuli semeniferi, and passing up to form the vas deferens; *l*, the convolutions of the spermatic vessels before they enter the testicles; *m*, *m*, the corpora cavernosa of the penis, with its muscular fibres intermixed: between the two, lies the urethra, the muscular fibres of which are seen running in the direction of that canal; *o*, the body of the penis divested of its outer coverings; *p*, the glans: the dark part shews a portion of the sheath immediately investing it, and thrown into folds to admit of the increase of the dimensions of the penis; *q*, the termination of the urethra by a loose floating extremity, which is fixed in a cavity peculiar to the horse; the outer part of the glans is laid open to shew this more distinct, as well as the internal structure of the glans itself.

Viscera of the Chest.

The *pleuræ and mediastinum* —When the chest is opened, a smooth polished membrane is seen, covering its whole surface, and likewise investing its contents. Each side of the chest has its particular *pleura*, which is distinct from that of the other by the intervention of cellular membrane. So conjoined, they form the mediastinum; the two lamen of which are strongly attached to the sternum, and compose what is called the inferior mediastinum; from whence separating, they receive between their laminæ the heart and its vessels, and are afterwards reflected over the lungs; which having completely invested, they again unite, and form the superior mediastinum, as it has been called. Near the vertebræ they again separate, one portion passing over the half of the spine on one side, while the other passes over the remaining half of the spine on the other side, to line the whole cavity of the chest. By this division a tubular opening is formed, in which are situated the thymus gland, aorta, vena cava, vena azygos, ductus thoracicus, and œsophagus.

There are therefore two reflections of the pleura on each side; one connected to the surface of the chest, the other to the surface of the lungs, forming by this means a distinct cavity for each lung, in which is contained a small quantity of fluid, termed *liquor pleuræ*. It is the diseased increase of this fluid, that forms hydrothorax, or dropsy of the chest, which is so common a termination of inflammation of the lungs. The pleural surface, which comes into view on opening the chest, whether of the lungs or of the chest itself, is smooth, that it may facilitate the sliding of these parts over each other, which the healthy serous secretion from the surfaces further facilitates; but the attached pleural surface is rough and fibrous, to hold the parts together: it is also so dense, that if by accident the pleural bag in which a lung is contained be cut into, the lobes on that side usually collapse, and are rendered useless by the entrance of the external air; this appears, however, not to be the constant effect.

The *mediastinum* is therefore nothing more than the duplicature of the two pleuræ, which divide the chest into two nearly equal portions: the right being rather the largest, in consequence of the situation of the heart, but the difference in capacity is not so great in the horse as in the human. This complete division of cavities is of the utmost importance to the animal, for by accidents in which the chest becomes penetrated, if the total collapse of the lungs were to take place, death must ensue; but life can be carried on by one lung, when an injury to the other has rendered it useless. By this wise provision, ulceration also sometimes confines its effects to one side of the chest only, and the animal becomes supported finally by the other. That portion of the pleura which lines the bony cavity of the chest, is termed the costal pleura, while the reflected portion receives the name of pulmonary pleura; and which distinctions are necessary to be kept in mind, both in the surgery and pathology connected with these parts. These membranous investments are supplied with blood by the intercostal arteries, and they return it by intercostal veins. The nerves are also branches from the intercostal nervous trunks; but they are small, and therefore, except under inflammation, the sensibility of the pleura is not great. The disposition in the pleura to take on inflammation, independent of the lungs, is not very clear in the horse. Indeed, the distinction between pleuritis and pneumonia is equally contended in the human subject. The lymphatics of the pleura must be considerable, from the effects we observe in the restoration of health, after the congestion of inflammation.

The *thymus* is a spongy and apparently glandular body, placed anteriorly between the duplicatures of the mediastinum, contiguous to the sternum and to the aorta, and vena cava, at their division. Its shape is irregular and various, sometimes appearing to be formed of two lobes, at others seeming one mass: its substance in the young subject is cellular, and its size considerable, and at this time it is said to contain a small portion of whitish fluid. As the animal advances in age, its colour changes, it becomes less, and at last it is scarcely discernible. No excretory duct has ever been discovered, and neither in the horse nor the human is its use known*. It is this substance that forms the sweetbread of veal. La Fosse says, it is sometimes diseased in calves, and that it occasions a tumour which proves fatal to them. It has a small artery, and vein and nerve, given off usually from the internal pectoral; the nerve from the intercostal.

The *diaphragm* or *midriff*, is a most important muscle†, and, like the heart, is in constant action during life. It is a broad, thin, tendinous, and fleshy expansion, and is so situated as to form a complete septum or division between the thorax and abdomen, not completely elliptical, for its upper part, opposed to the back, extends considerably farther towards the lumbar vertebræ, while the anterior part is attached to the sternum, consequently its situation is rather oblique. In a state of rest, it is anteriorly convex, and posteriorly concave; that surface opposed to the thorax being covered by the pleura, and that towards the abdomen by the peritoneum. From some peculiarities in the disposition of its fibres, it is sometimes described as two muscles; the great and little dia-

* As the thymus gland in dogs is large, and the thyroid small; and as it usually happens, that when one is considerable, the other is the reverse; so we may reasonably suppose that their use is the same.

† Nobilissimus post cor musculus.—*Haller.*

phragm. The anterior or larger portion arises by distinct tendinous fleshy fibres from the ensiform cartilage, from the posterior extremity of the sternum, from the internal surface of the cartilages of the true ribs, by portions which admit of small tendinous digitations between them (see *Plate* IV.): passing upwards, and posteriorly attaching itself to the false ribs, its fleshy portions terminate near the spine. From all these origins, the fibres are directed like radii from the circumference of a circle to a tendinous centre. This tendinous middle portion is perforated by a triangular hole towards the right side, a little inferiorly to the spine, for the passage of the vena cava.

The superior, posterior, and lesser portion of the diaphragm, fills up the space left by the larger; arising by different portions from the first, second, and third lumbar vertebræ, of which the two central ones are called its *crura* or *pillars;* between which an interval is left for the passage of the aorta, called its *hiatus*, and for the vena azygos, and thoracic duct. A little to the left is situated the third opening of the diaphragm, formed from the decussation of its fibres, and giving a passage to the œsophagus and par vagum nerve.

Vessels and nerves of the diaphragm.—The aorta, in its passage between the crura, usually gives a branch or two to this muscle; besides which, it receives other rami from the arteries of the chest. (See *Arteries.*) Its veins are infinitely larger than its arteries, that the blood might not feel the effects of pressure in its motions; they finally pour their contents into the vena cava. The phrenic nerves arise from filaments given from the fourth, fifth, and sixth cervicals; there are, besides, other small branches given from the surrounding ganglia and from the great sympathetic, the office of which latter seems to be rather to preserve the general sympathy between the whole organs, which exists in so wonderful a degree by means of these nervous connections, than for the motive powers of the diaphragm itself. This muscle is the principal agent in respiration, which we shall more fully shew when treating of the lungs: the act of sighing is also principally brought about by its means; and in those animals who vomit, it appears an important agent. It is more subject to sympathetic or contiguous inflammation in the horse, than in the human; for when any of the abdominal viscera are inflamed, this usually partakes of it considerably.

The Heart.

The *pericardium* first presents itself to view when we wish to examine the heart, and which we shall find to be a membranous sac surrounding the heart, similar in structure to the pleura. Its outer surface is attached to the mediastinum, between the duplicatures of which it is situated; and its inner surface is contiguous but not continuous to the heart, for there is a fine fluid interposed. It appears composed of two laminæ, and is attached above to the vessels, over which it is reflected, giving them an attached covering; and below to the sternum; but is not, as in the human, attached to the diaphragm: for the horizontal position of the animal alters in some measure the position of the heart. Its inner surface secretes a very fine fluid, called *liquor pericardii,* which thus preserves a freedom of motion between the heart and sac: in health this is about an ounce in quantity; but when it becomes much increased beyond this, it constitutes dropsy of the pericardium; which is, however, not a frequent disease in the horse.

The *heart.*—This important organ appears a composition of muscular fibres combined with membranous matter, to form a conoidal body with four principal cavities, and several openings, common and proper. It is situated as above described within its sac, between the lamen of the mediastinum; with its base in a line with the dorsal vertebræ, and its apex, which is slightly curved, directed to the left of the sternum between the eighth and ninth ribs; so that it is situated rather more to the left than to the right of the chest. Its sides, which are rather flattened, are right and left, and its edges by this means form an anterior and a posterior. Two of its cavities are situated immediately within its muscular mass, and are its ventricles; the two others are rather external appendages, and form its auricles. It has a smooth exterior general covering, which arises from the pleural portion reflected over the pericardium; and its lower part is surrounded by a variable quantity of fat. Around its base, and between its ventricles, are seen the coronary vessels running in their various courses; and from the same part issue its grand trunks also, by means of which it is principally retained in its situation.

The *ventricles.*—Each ventricle opens by two orifices, one of which communicates with the auricles, the other forms the mouth of a large artery. The right ventricle opens into the right auricle and into the pulmonary artery, the left into the auricle and into the aorta; at the edges of which orifices there are valves. These two ventricles are separated by a septum, which lies neither directly across the chest, nor is its direction truly anterior and posterior, but is oblique; so as to form the cavities as properly into an anterior and posterior ventricle, as into a right and left. The *right* or *anterior ventricle* is larger than the left in the adult horse; in the new-born colt it appears to be smaller; but many impediments to the circulation tend to stretch and increase it through life: it likewise does not extend quite so far to the apex as the other. The right ventricle is strengthened by fleshy pillars, called *carnea columni,* and also by *tendinous cords* attached to the valves of the auricle and ventricle, and by which the mechanism of these parts is much strengthened. The *left* or *posterior ventricle* is much thicker and stronger than the right, and its capacity is less: it is however something longer than the right, occupying the apex; whereas the right ventricle ends before it arrives there. The inner surface of both ventricles is very uneven; and presents stringy productions from the fleshy and tendinous part, and also cavities which dip in between these: but these productions and inequalities are not so varied nor so considerable in the horse as in the human, though even here they are sufficiently diversified to afford an admirable proof of the importance of this organ, and the great pains Nature has bestowed to give it mechanical strength.

The *valves.*—We have already noticed, that each ventricle has two orifices, an arterial and an auricular; and that their openings are furnished with strong membranous appendages, whereby the blood is prevented from passing but one way; and which are called their valves. Those of the arterial openings are called *semilunar;* and those of the auricular, *tricuspid.* The auricular valve of the left ventricle is likewise called *mitral.* The structure of the valves appears to arise from a duplicature of the inner coat of the part, forming a kind of fold, or of several folds, with fleshy fibres, which are differently disposed, according as they permit the entry of the blood or its exit. The membranes which form these valves in each cavity, are attached so as to project forward, and both of them are connected by the tendinous strings from the sides of the ventricles. As either ventricle contracts, the blood is driven into the artery, which communicates with that ventricle; and the tendinous cords being relaxed, the sides of the cavity are brought nearer to each other, the valves close the opening into the auricle, and the only passage that is left, which is the artery, receives the blood. The heart after this contraction becomes again relaxed, by which means these tendinous cords are again stretched out; and the valves of the auricle being drawn downwards, the blood is poured by the veins into its recipient cavities.

Vessels of the ventricles.—The left or posterior ventricle sends out a large artery, which is termed the *aorta;* it proceeds but a little way when it divides into two trunks, which in the horse are very justly termed anterior and posterior. The first is distributed to the head and anterior extremities; the other furnishes the trunk and posterior extremities. The right or anterior ventricle gives out the pulmonary artery, which runs upwards and forwards by the side of the aorta, and then, dividing into two trunks, is distributed to the lungs. (See *Arteries.)*

Auricles.—The auricles are muscular and membranous appendages situated at the base of the heart, corresponding to the two ventricles, and having a septum between, so that there is here also a right and a left. The left or pulmonary auricle is placed above, and opens into the left or posterior ventricle; and the right in the same manner communicates and is situated upon the right or anterior ventricle: externally, they appear but one cavity, and are unequally divided; by which the right is much larger than the left, and are so placed, that there is little seen on the left side. They are within very uneven, but smooth externally, with indented edges like a cock's comb, and pendulous. The *right and larger auricle* is irregularly rounded, and has two openings; an anterior and posterior, which receive the anterior and posterior vena cava. The *left auricle* is considerably more muscular than the right, though its size is less: it is irregularly square, and has a small appendix similar to the right. Into its angle the pulmonary veins pass; and it has a common opening with the ventricle, as has been described. The substance of the auricles is both membranous and muscular, and they are also furnished with a few tendinous and fleshy cords to strengthen them.

The heart, in common with other organs, is furnished with blood vessels that supply its substance with blood; these are termed coronary. The *coronary arteries* are two branches which are given off from the aorta, immediately after its origin, and are distributed around the base of the heart, and between the line of separation of its ventricles, in principal trunks and lesser divisions to every part of it. The blood is returned in part by the coronary veins, and part appears to penetrate the substance of the heart, and to be poured into its cavities. The cardiac plexus, which is formed from the par vagum and intercostal nervous trunks, in conjunction with rami from other ganglia, furnishes this organ with its nervous influence. It is an involuntary organ; but by its nervous connections, it is subjected to a very intimate and extensive sympathy with all the important viscera, as well of the belly as of the chest. Carditis, or inflammation of the heart, as an idiopathic affection, is not a common disease; it has however occurred. Ossification of its valves has also been observed, but very rarely; and dropsy of the pericardium, except as an adjunct to serous effusion within the chest, still less frequently seen.

Circulation of the Blood.

The heart is the fountain by which the blood is forced through all parts of the body, and which passage of the vital fluid to and from such parts is called the *circulation*. Although the antients appear to have formed correct notions of the use of the blood, and to have been well acquainted with the organs concerned in its passage, yet they had a very imperfect knowledge of its transit through the body: and it remained for the immortal Harvey to demonstrate the curious and important round of circulation, in a clear and satisfactory manner. The course which the blood takes in the fœtal colt differs widely from that of the adult horse. The former will be described with the parts of generation; the latter is the subject of our present inquiry, and which we shall prosecute by the ordinary method of dividing it into the pulmonary* and the general, or the lesser and the greater circulations.

The *lesser*, or *pulmonary circulation*.—The blood of the two cavas, being poured into the right or pulmonic auricle, irritates that sac to contract, by which the valves of the right or pulmonic ventricle are forced close to its sides, and the blood rushes into the cavity. The moment the blood is thus received, the sensible surface of the ventricle is stimulated to contract on it, which shuts up the tricuspid valves that permitted its entry, and which cannot now be forced open, being held firm by the tendinous cords from its sides. The contained blood, therefore, now seeks another course; and the very action of the valves proceeding from the sides to the axis of the heart to shut the ventricle, opens the pulmonary artery, by pressing the loose sail-like edges of its valves towards its sides, and leaving its cavity extended, into which the blood, by the contraction of the ventricle, is now forced. The blood then received into the pulmonary artery proceeds to be circulated through the lungs, around the air cells, and is taken up and returned by the pulmonary veins; nor can the blood once received by the pulmonary artery return again to the heart, until it has taken this course; for the semilunar valves, as soon as the ventricle becomes relaxed, are drawn down and prevent it. The pulmonary veins, therefore, receiving the blood from the right, or anterior side of the heart, by means of the ramifications of the pulmonary artery, empty themselves into the left or posterior auricle; which, having received it, becomes likewise stimulated to contract: in its turn also, and by which means, it is forced into the left ventricle; and thus much of the motion of the blood is termed the pulmonary, or minor circulation, and which appears to have been known to many of the antients.

The *greater*, or *general circulation*.—We have traced the blood into the left ventricle, from which it is prevented returning again into the left auricle, by the closing of the mitral valves. The reciprocal contraction of the left ventricle drives the contained blood in the direction of its axis against the valves of the aorta, which being thus pressed on, allow the passage of the fluid into this vessel, from whence it is distributed, by its branchial divisions and ramifications, to every part of the body, to furnish it with nutritious principles. After this being again put into a course of circulation through the minute venal branches, it is finally again poured, by means of the anterior and posterior cavas, into the right auricle, and

* There seems great propriety in denominating the vessels which contain the blood previous to its aeration, *pulmonic*, according to Dr. Barclay.- *Anatomical Nomenclature*, p. 176.

thus is formed a complete round of sanguineous circulation. It appears that the contraction of the two ventricles is synchronous, and that at the same time that the blood is driven from the left ventricle into the aorta, the right ventricle impels it into the pulmonary artery; consequently the relaxations seem to be alike in point of time also; the period of the left auricle's receiving the pulmonary blood, being that in which the right auricle receives the blood of the cavas: from which it will be equally evident, that the relaxation of the ventricles and the distention of the auricles are synchronical also. These alternate contractions and dilatations of the heart are called its *systole* and *diastole*. The contraction, or its systole, presses the blood into the arteries; which receiving it, become distended, when, uniting to the force of the heart a contractile power of their own, the blood is propelled through the body. It follows therefore that when the heart is in a state of contraction, or systole, the arteries are in a state of distention, or diastole: and it is in this state we feel that motion in them which we term their pulsation; for the elasticity of the external coat, having dilated the artery after the action of the muscular coat has ceased to contract, it produces a bound, or pulsatory stroke, under the fingers. It is to be remarked that the sensation which we understand by the term pulse, is conveyed by the heart also by the systole of its ventricles, which forcibly raises its apex against the ribs. (See *Pulse*, p. 153.) The heart is stimulated into different degrees of action; or its contractions and dilatations are more frequent in some animals than in others. The larger the volume of animal bulk, the less numerous in general are the contractions of the heart, and the less frequent is the *standard pulse*. In smaller animals the irritability is greater, but the ratio of muscular fibre is smaller; consequently what is lost in strength of action, is necessarily made up in frequency: on which principle also, we are aware why the contractions are more frequent in young than in old animals*.

From all that has been said, it will be evident that the two circulations, as they are called, form in an extended point but one general circulatory course of the blood through the body of the horse; and which course is universally kept up, except in a few instances, where the economy requires some speciality or deviation; as in its passage through the liver, in the corpora cavernosa of the penis, and in the cavernous sinuses of the dura mater.

The *physiology of the heart*, as the exciting cause of circula-

* The action of the heart is liable to be influenced likewise by accidental circumstances. Disease will materially increase or diminish it often; and which alterations may, in some instances, be the result of an alteration in the animal fibre, *per se*; and in others, in the stimulating qualities of the blood itself.

tion, or the means by which it is influenced to contract in ordinary cases, with a remarkable regularity on its contents through life, has been a subject of unceasing inquiry with physiologists; and whether this organ have an inherent power of contraction, or whether it gain it by a stimulating quality in the blood, has been an almost endless subject of dispute. By some its actions have been attributed to nervous influence, but it has few nerves: nor will the stimulus of distention maintain more ground, seeing that the heart of a frog when empty, and separated from the body, will continue to contract. Neither is the matter further elucidated by the often observed fact of the right side of this viscus remaining distended with blood after death, while the left is usually comparatively empty; for although the connexion between the heart and lungs is great, and the phenomena of circulation and respiration intimate, yet this congestion may be transferred from the one side of the heart to the other, by varying the mode of extinguishing life; which consequently shews that respiration is not the sole cause of this phenomena, on which so many physiologists have hinged their inquiries. It would appear from all that is already known, that an inherent contractile disposition of the heart, *sui generis*, is assisted by a stimulating quality in the fluid received, and that both are necessary to keep up permanent contractions: but that, individually, each are capable of operating for a time the ordinary phenomena.

The *diseases of the heart* are not numerous in the horse. Carditis, or idiopathic inflammation of its substance, is by no means frequent, although well marked cases have now and then occurred. Its covering, or pericardium, however, often participates secondarily with the inflammatory states of the lungs in pneumonia. A primary inflammation of the pericardium usually ends in hydrops pericardium; and very large collections of fluid have been found in horses who have died under such disease. Occasionally the valves of the heart, and its substance also*, have been found ossified, and which probably gave rise to the account among the ignorant, that there existed naturally a bone in the heart.

The Lungs.

If we suppose a horse to be placed on his back for dissection, as soon as the sternum is detached from the ribs and the mediastinal fold, the viscera of the chest are brought into view as in *Plate* IV. It will be there seen, that each side of the cavity of the chest is occupied by soft, spongy, and slightly elastic masses, called lungs, having the heart appended between

* Mr. Henderson, a veterinary surgeon of London, possesses a remarkable specimen of ossification of the substance of the heart, in which the right auricle appears completely bony. After a state of long emaciation, this wretched subject dropped lifeless while dragging a dust cart.—*Percival's Lectures.*

them. The absence of the air alters somewhat their situation, and greatly decreases their bulk in the dead subject*; but if they be again inflated by means of a canula passed down the trachea, they will then be found to reassume their original form and bulk, and to completely fill the parietes of the thorax, to which their figure is adapted, being convex towards the ribs, concave towards the heart, and flat where contiguous to the diaphragm. The lungs have a distinct division into a right and left mass, each of which presents deep fissures, partially dividing its substance into what are called its lobes. These divisions are not always the same in every subject, but in the majority of instances the right lung, which is the largest, presents three lobuli, and the left two only. As has been already described, the pleura first lines the cavity of the chest, and then is reflected over the lungs, affording them a dense covering. Being again reflected from each lung by a union of its laminæ, it forms a septum, or complete division of the chest, into two distinct cavities, and thus effectually shuts out all communication between one lung and the other, except by their vessels. The colour of the lungs varies considerably. In the colt they present a lively pinky hue: in the adult horse they are darker, and in very old subjects they become of a blueish cast and patchy, with a somewhat granulated appearance. Within they are darker than without, from their extreme vascularity. Their substance is formed from the ramifications of the bronchia, or air vessels, and the blood vessels which accompany them, held together by an intervening cellular substance called the parenchyma.

The *bronchiæ*.—Some notice has been already taken of the trachea, or grand air tube of the lungs, which was described as a continuation of the larynx, taking its course (*vide Pl.* IV) along the anterior and inferior part of the neck, penetrating the chest between the two first ribs, and immediately under the curvature of the aorta bifurcating into the two bronchiæ. The right bronchial branch corresponds to the right lung, in being the largest: it soon divides into three trunks. The left, which

* A collapsed state of the lungs is common to the animal before birth, and after death, but in different degrees. In the fœtal colt air has never entered, and consequently the collapse is so complete, that the lungs are, like the other organs of the body, specifically heavier than water: and which fact is resorted to in human medical jurisprudence, to determine whether a child were born alive, *i. e.* had expanded its lungs with vital air, and which appears the first animal act, as expelling the air from the lungs is the last effort of life. But after once having been distended with atmospheric air, they are never, except under extreme disease, so perfectly collapsed as in a fœtal state: a partial collapse, which greatly diminishes their bulk, takes place when the chest is opened into by the pressure of the external air, and this whether the animal be living or dead, which forms an important fact in surgery; and such accident would be instantly and invariably fatal, were it not for the wise provision made by the complete cavity each lung owns, which is totally distinct from that of the other.

is the longer, from the necessity it has to stretch itself under the posterior aorta, usually subdivides into only two principal trunks. The cartilages of the larger bronchial tubes are not, like the cartilaginous portions of the trachea, completely annular*, but, on the contrary, they are true segmental portions connected together by an elastic membrane. As minuter subdivisions of the bronchiæ are formed, the cartilaginous structure becomes less distinct, and in the extreme ramifications is altogether lost. The bronchial tubes are lined throughout by the vascular mucous membrane, which lines the larynx and trachea, and from which a mucus is continually secreted to coat the surface, as well as to furnish a liberal supply of serous fluid, from which secretion the air that is returned from the lungs is always loaded with moisture. The extreme ramifications of the bronchiæ end in minute cavities or cells†, over the surfaces of which are spread, in capillary tubes of exquisite minuteness, the ultimate ramifications of the pulmonary arteries, whose trunks accompany the bronchial branches, side by side‡. The venal ramifications receive the blood from the surface of the cells which the arterial capillaries had deposited, from whence it is collected and returned to the heart by the four pulmonary trunks described in the Angiology.

The lungs are furnished with appropriate blood, by means of the bronchial arteries, which arise by one trunk from the posterior aorta, and after having nourished the parenchyma, bronchiæ, &c., return the blood by bronchial veins into the vena azygos. The nerves are furnished from the anterior and posterior cervical ganglions; but except under inflammation, these organs are not endowed with much sensibility. Their lymphatics are very plentifully distributed throughout their exterior surface and their interior substance, and have been successfully injected in the horse.

The *diseases of the lungs* are acute and chronic. One should,

* The trachea of the horse is more cylindrical than that of the human, in whom the tracheal cartilages are mere segmental portions, leaving a flattened space behind, corresponding with the prominences of the parts posterior to it; but which speciality was unnecessary in the horse, whose neck is so much wider. In him the tracheal cartilages are more annular, being very thick in front, but gradually tapering into semicartilaginous slips, which are not attached end to end, but lie loose within the membranous posterior folds; by which formation they are enabled to slide over and within each other. At this part, likewise, a muscular fold stretches across, apparently to act on the diameter of the tube.

† These cells are readily demonstrable to the naked eye in the amphibia, and appear disposed to dilate and yield to the stimulus of pressure, since they are said to be considerably enlarged in the pearl divers. It is also very possible that on their varied dimensions, in a great measure, depends the superiority of *wind* in some horses over others.

‡ Mr. White denies the existence of these cells, and affirms that injection will shew that the bronchial ramifications are continued to the very surface of the pleura, where they end. But it may be suspected that the very mode of proof, by injection, will destroy all traces of primary organization.

à priori, be disposed to attribute to the lungs of every animal a great tendency to disease, from observing their extreme vascularity. How much more reason, therefore, is there to expect it in the bulky form of the horse, removed as he is from a natural to an artificial state, and daily employed in exercises which must hurry the blood through his chest in an inordinate degree? To these causes it is owing that we find him so peculiarly subject to acute inflammation of the lungs and their envelopements, and to the chronic affections of broken wind, thick wind, as well as the symptomatic phthisis pulmonalis, the consequence of glanders.

Respiration.

The physiology of respiration is a most important subject for the attention of the veterinarian, whether as regards its forming one of the keystones to the animal functions, or its variations proving a prominent feature in most of the important diseases of the horse. The fœtal colt subsists by the direct communication of its organs with those of the mare, through the medium of the placenta; by which it receives both vital heat and nutritious increase. As soon as it is born, it continues to receive its alimentary nutriment by an indirect communication with the mother, but for vital heat it has to depend wholly on its own organs. The lungs, which hitherto had remained passive from the medium in which they were placed, are now roused into action; the muscles of the chest enlarge the cavity, and the air rushes in, from its elastic properties and tendency to occupy every vacuum. The air having once entered the lungs, they are never completely emptied from it again. The lungs themselves are nearly, or wholly, passive organs, and have little or no power to act; but their distention is principally brought about by the enlargement of the capacity of the chest; by which, they being cellular and cavernous, and communicating with the open cavities of the mouth and nose, become filled with the external air. The chest becomes enlarged in its circumference by the elevations of the ribs, and it is enlarged in length by the contraction of the diaphragm. The first rib being fixed, becomes a fulcrum to the rest, which enjoy some motion by means of their articulations with the spine, as well as by the flexibility of their cartilages; and which motion takes place in a much greater degree in the posterior ribs, from the increase of their circular form, and the peculiar attachment of their cartilaginous appendages, which elevates the parietes of the chest, and turns the cartilaginous angles slightly outwards*. It is, however, to an enlargement of the capacity of

* This circular external enlargement of the chest in horses has been doubted, except on extraordinary occasions; but whoever will be at the trouble of examining the matter experimentally, will find that by means of the intercostal and other proper respiratory, as well as assistant muscles (see *Myology*),

the chest through the agency of the diaphragm that we are principally indebted for the general inflation of the lungs. This muscle in a state of rest is convex towards the breast, and concave towards the abdomen; but when its muscular fibres contract, it becomes plane-like, which forces backwards the abdominal viscera, at the same time enlarging the thoracic cavity, and also, by forcing backwards the abdominal contents, swelling the posterior parts of the belly, as we observe at every inspiration, and whence arises the term of "heaving at the flanks:" thus it is that this action and re-action of the diaphragm and abdominal muscles, in the displacement of the abdominal contents, afford so just a criterion of the state of the respiration to the experienced eye, as to whether it be ordinate or inordinate. The air thus received into the lungs expands their cells throughout, by which means the blood in the right side of the heart finds a ready passage through them by means of the pulmonary artery, and hence the opening between the two sides of the heart in the fœtus becomes useless, and closes up. As soon as the lungs are nearly filled, an uneasy sensation is felt, which obliges the thorax to contract; the diaphragm relaxes, and the abdominal muscles shorten, by which the contents of the abdomen are forced against the now passive diaphragm; the intercostals cease their action, and the capacity of the chest is diminished; by which the air is expired, or forced out of it. After a momentary pause, the blood becomes collected in the right side of the heart, owing to the resistance it met with in the pulmonary artery, from the collapsed state of the lungs, and which causes a pléthora in every other part of the body; from which we can account for the fulness of the vessels of the head, the starting of the eyes and flushing of the face in persons who meet with any temporary stoppage to respiration: should the obstruction remain permanent, some of these vessels frequently rupture. From this accumulation it becomes necessary for fresh air to be drawn into the lungs, forming a new inspiration: and in this manner the routine of respiration is carried on.

There is a certain consent, or proportion, between the action of the heart and that of respiration, in the ordinary state of the animal; but this proportion is not always the same. If more blood be sent to the heart by the pressure of exercise, the respiration will be likewise accelerated: thus, in quick motion, or great exertion, there is panting or quick breathing; the air being suddenly expelled, and as quickly inspired, that no obstacle may be offered to the passage of the blood. This becomes also necessary on another account, for, as the force of

some dilatation continually takes place. That a very considerable enlargement occasionally occurs, we know from the extraordinary distention of the costal arches, which many horses bring about to resist the action of tight girthing.

the respiratory muscles, particularly the auxiliary ones, must be diminished when other muscles are in strong action, therefore what is wanting in strength is made up in celerity; the auxiliary muscles in these cases being able to act but little, as their fixed points must be the chest, and their moveable ones the extremities. For it must not be lost sight of, that respiration can be aided by many other muscles besides those immediately described as respiratory. The large masses between the scapulæ and ribs, the sternal, brachial, and others passing between the chest and neck, are of this kind, and expand the chest as occasion requires. It is thus that when accelerated motion has, as it is termed, " blown" a horse, he is observed anxious to fix his fore legs wide apart and inclining forward, and to depress his head, that he may make all these parts act as fulcri to expand his chest; and how grateful an assistant it is at this moment to loosen his girths, every humane fox-hunter is fully aware.

The Nature and Properties of the Blood.

The nature and properties of this fluid belong to the section on hygrology; but as it is so intimately connected with the parts just described, we shall consider it in this place. The blood was in the earliest ages accounted as of the greatest con sequence to the animal machine: perhaps, the great stress laid upon it in the Bible has not a little contributed to continue an opinion of its importance, seeing that there men were strictly commanded to refrain from blood, because "*it was the life.*" But it is remarkable, that though the very great importance of this fluid was known to the antients, and to an alteration of its properties was attributed most of their maladies, yet they had no just conception of its circulation through the body. That it had motion they were aware; but they in general conceived its movements to be like the ebbing and flowing of the sea, and that during sleep these were reversed. A century before Harvey lived, the valves of the heart were accurately described. Favetus, likewise, who lived eighty years prior to him, noticed the disproportion of the pulmonary artery in the fœtus. Ano ther antient author, who was a great theologist, and wrote on the Trinity, for which he was burnt, speaks, in his work, of the use of the pulmonary artery to the lungs, and of these masses absorbing a subtle fluid from the air.

Dr. William Harvey, an Englishman, published, at Frankfort, his grand discovery of the blood returning to the heart by the veins, which before was supposed to flow immediately from the heart by them. Having once commenced his researches, he did not leave them till he gave us the true route and course of this fluid through the body; and he also was impressed with a notion that it owned a life, *sui generis**. An acquaintance with the various secretions of the body continued to increase our knowledge of the importance of this fluid; but its real nature and properties have been much further illustrated by that great anatomist and physiologist, Mr. John Hunter. He revived the ide of the *life of the blood*, and by the ardour with which he pursued the subject, he in fact made it his own; and although there is now reason to believe he carried his ideas too far, and attributed too much power to this fluid, and too little to the solids; it is yet to be remembered, that few pursue a subject without following it to its utmost limits of probability, and that a favourite child is seldom viewed but on the bright side: to which it must be added, that he constantly applied the whole of his theory to practice, and that he founded most of his ideas on actual experiment.

The blood forms a principal part of most animal bodies, and is of various colours†; but in quadrupeds, and all the vertebrosa, it is always red; circulating through every part of the body, by means of the heart, arteries, and veins. It does not appear to differ essentially in the various brute tribes, having in all the same properties of preserving life generally; that is, the blood of one quadruped will support, under all its functions, another quadruped, as we learn by transfusion. In the horse there appears but little difference between his blood and that of other brutes, nor between it and that of man. Horse blood is however less intensely red than that of the human; it also generally, but not invariably, presents a smaller proportion of serum, from which it separates more slowly; and in common with blood of the herbivora, it does not putrefy so soon. The quantity that an animal contains, in proportion to his bulk, has been endeavoured to be ascertained: but the results have been various; nor can the truth be easily gained: in some instances the quantity appeared equal to one tenth of the whole; and in others, again, it has been computed as a twentieth. Animals with much fat on them, appear to have proportionally less than lean ones; and in those in a state of close confinement, the quantity is found to be smaller‡ than in the wild. A medium sized horse has lost forty-four pounds without apparent injury, and most will lose one-fifteenth of their total weight before life becomes extinct: but as, under these circumstances,

* Hunc quoque apparet sanguinis principalitas, quod pulsus ex eo ortum ducat. Nec sanguis solum pars primigenia et principalis decendus est quod ab eo motus pulsus que principium orietur; sed etiam quia in eo primum *calor animalis* innascitur *spiritus vitalis* ingeneratur, et *anima* ipsa consistit.—*Harv. Exer.* 51.

† It is limpid in various tribes; white in some of the crustacea, as the lobster and shrimp; and green among insects, as the grasshopper and white caterpillar.

‡ Phil. Trans.

much must still remain in the heart and vessels, we cannot compute it in the horse at less than one-twelfth of the whole weight. The blood is, however, with regard to each individual, a variable fluid, appearing in different proportions at different times, and which proportions likewise vary in different parts of the body. It putrefies by a gentle heat, and, under some circumstances, effervesces. Blood is separable into a nearly colourless, and a coagulum, or red part, which separation is spontaneous out of the body*.

The *coagulum, cruor,* or *crassamentum,* is found to be composed of two parts: that to which it owes its colour is called its red globules, although the form of the particles has been a subject of infinite dispute: the other component gives to these consistence and adherence, and is known by the names of coagulable lymph, fibrin, and gluten. As some animals have no *red particles* in their blood, and as many others are only partially supplied with them, as fishes; and as in all there are organs wherein they are not found, as in the transparent part of the eye, it has been supposed that they were the least important portions of the blood. Mr. Hunter, however, considers them as greatly connected with the strength of the organs, as he observed those parts subjected to great exertion, as the muscles were full of them; and in proportion as the muscles are more or less highly coloured by them, so, he observes, are they stronger or weaker†. Butchers bleed their calves repeatedly to make their veal white, from whence one would infer that the red globules are longer in forming than the other parts.

The *coagulable lymph,* or *fibrin,* which forms the other portion of the clot, appears to be the most important part of the vital fluid, and is present in every animal. It appears to have undergone the most complete animalization of all the other parts, and is mechanically, but intimately, mixed with them. After the perfect abstraction of the serum and red particles by maceration, it will be left nearly limpid, firm, tough, and fibrous. It appears to be that part of which all the solids of the body are immediately framed, by the action of the vessels. It forms the callus of bones, and can become organized whenever extravasated, either by its own specific action, or by the action of the solids upon it. It readily coagulates, is soluble in alkalies, but insoluble in water, oils, or ardent spirits, and yields salts by incineration. The coagulation of the fibrin appears in direct proportion to the weak action of the vessels; that is, whenever they act strongly, whatever may be the gene-

* Blood from a horse requires double the time to coagulate than that from the human.

† But that red blood is essentially necessary to powerful muscular contraction, we know to be erroneous; for the muscles of many fishes, and which are all endowed with surprising strength, are most of them colourless. The pectoral muscles of many fowls are equally so, whose exertions are necessarily very great. In the grouse, one layer is colourless and the other dark, but both are equally strong.

ral state of the system, this coagulable part consolidates more slowly, by which means the red particles, which at other times it holds suspended, fall to the bottom; but the lymph being now separated from them, forms on the top of the crassamentum, and is that which is termed the buff or size. This buffy appearance being hence considered as indicative of an inflammatory state of the vessels, is among practitioners carefully sought after; and it therefore becomes of considerable importance to inquire what accidental circumstances tend to hasten or retard this coagulation, that we may not be led to form a wrong prognosis from its appearance. Its being detached from the body quickly by a large orifice into a deep vessel with a narrow bottom, tends to retards its coagulation, and consequently assists the separation of the red particles, and the consequent appearance of the buff: in all acute inflammatory diseases, it is therefore recommended to draw the blood in this manner*. On the contrary, when the blood is drawn slowly away, and falls into a wide vessel, it coagulates more quickly, and the separation between the two parts is not in these instances found to be so complete†.

The serum is the fluid basis of the blood, which it serves to dilute, and forms about four-sevenths of the whole; the proportions being somewhat smaller in the horse than in the human‡. It is slightly saline, and less putrefactive than the coagulum. It remains fluid in every degree of heat, between 30 and 160

* Where the convenience of the practitioner will not allow his stay to watch the perfect separation of the red from the fibrous part, a pretty certain indication of the buffy state of the blood may be drawn, by applying the fingers to it a few seconds after bleeding, when if the red particles do not adhere to them, but the yellow serum only, such blood will be commonly buffy. *(Percival's Lectures.)*

† It is, however, necessary to remind the junior practitioner, that what has been just recommended with regard to bleeding from a large orifice, in this instance, merely relates to the effect it has on the blood after it has parted from the body, and which indications, if he be expert in his profession, he will not materially need; but there are other reasons why this practice is adviseable, from the sudden check it gives to the circulation, which often greatly impedes inflammation, and allows the vessels to contract on their over-distended sides. It may likewise be not altogether irrelevant here to hint that in the horse, as well as in the human, what is termed a buffy state, is not so invariably a proof of diseased increase in the circulation as has been heretofore supposed; but that it may and does exist in a healthy state often; and that in some cases of disease, if blood be drawn, as long as this appearance presents itself, the last drop may be abstracted. The cupped appearance which the coagulum puts on, and which is so much depended on in the human, as a proof of an inflammatory state of vascular action, although its existence be denied in the horse, yet most certainly it does exist; and that both in health and disease, as I have witnessed in many instances, and which Mr. Percival also notices. Neither have I observed that this presents a more unerring criterion of inflammatory action than the buff itself. Prudent practitioners will therefore do well to draw their inferences from an union of symptoms and appearances, and not from these alone.

‡ Mons. Gerard estimates it at one half, but which does not agree with my observations on it. Mr. Percival very justly observes, that the disproportions between the serum of the horse and man are in some instances scarcely observable, but in others they are

degrees Fahren. ther.; with a less heat it freezes, in a greater it coagulates. It appears chemically composed of albumen, gelatin, saline matter, and a considerable quantity of water. Serum appears not only the fluid base of the blood, but it also dilutes all the secretions as well; and it appears to be a separation of serum from the blood which forms dropsy. The *blood*, therefore, is a compounded fluid made up of these several parts; and which, considered as an aggregate, is a most essential component of the animal. All parts of the body are formed of it; and all parts of the body can be resolved again into it, by means of the absorbents; hence we must conclude that there is a very intimate connexion between the solids and the fluids, and this has occasioned modern physiologists to consider both as governed by the same laws, among whom Mr. Hunter stands foremost. The reasons which induced him to form this opinion, and the facts whereon it was founded, are detailed at large in his work on the blood: and as his writings have greatly tended to bring about a very important change in our ideas of both the healthy and diseased relations subsisting between the solids and fluids, so it is essentially necessary that the veterinary student should fully acquaint himself with the several opinions and facts which have so greatly assisted to bring the long reigning humoral pathology into disrepute. For many centuries a morbid condition of the fluids, but particularly a vitiated state of the blood, was considered as the principal cause of disease. This peccant quality in the humours of the body was called the *humoral pathology*, the overthrow of which, begun by Boerhaave, continued by Cullen, and completed by Hunter, has occasioned the different diseased affections to be ascribed to a vitiated action or derangement of the solids more than the fluids; contending that were the blood specifically affected in some diseases, as heretofore imagined, that, under such circumstances, the blood which circulates over the whole body would necessarily affect the system generally, and not locally. The blood, therefore, it is alleged, cannot contain in itself the morbific matter, for if it did, it is argued, inoculation by it ought to produce, in contagious diseases particularly, the same contagion which the introduction of the morbid matter itself would do. Great as have been the obligations which physiology, pathology, and surgery, owe to the researches of this distinguished character, yet it is now very generally acknowledged that the doctrines he inculcated have been carried too far, and that numerous facts, incontrovertibly proved, convince us, that the fluids of the body and the blood itself are not exempted from disease; but are in many instances specifically affected with morbid matter, which is capable, by inoculation or transfusion, of producing its like.*

* At the Veterinary College, the blood of a glandered horse was transfused into a healthy ass, who in a few days became affected with the same disease,

The Action of the Air on the Blood.

We have every reason to suppose, that the blood is constantly deteriorating; for it expends itself for the support and growth of parts: it therefore becomes necessary that it should have sources by which it may be meliorated and restored, and which sources appear to be derived from the lungs and the chylopoetic viscera. By the first it is altered and improved, and by the latter it is renovated in point of quantity. The blood appears to acquire from the air a certain part, or possesses itself of certain properties, whereby its qualities are brought back from a venal to an arterial state; which is the only state which seems fit for the purposes of support to the machine. When venal blood is exposed to the action of the air, it soon loses its dark hue, and becomes florid and bright in that part which is exposed to the atmosphere; and, as the other portions become successively exposed, they become in the same manner brilliant. Even if venal blood be placed under the cover of some transparent medium, as bladder, gold beater's skin, &c., it becomes also florid, although not in immediate contact with the air; and which is here a very important fact to note, for it is exactly thus that it must be changed in the lungs, where the air can act on the blood only through the transparent membrane enveloping the air cells. Consistent with these facts, if the blood within the pulmonary artery be examined, which, as before observed, performs the office of a vein, it will be found dark and venous, while that in the pulmonary vein will be found florid and arterial, and which changes exactly correspond, as far as regards colour, with what occurs in ordinary respiration, which exposes the blood in its passage through the lungs to the action of the air received into the bronchial cells. That this change of colour arises from the air, we know; for if we hang or strangle any animal, and then open each side of the heart, we shall find the blood in both equally black and venous. A change in the colour of the blood is not, however, the only alteration it receives, otherwise it would operate on the red globules alone: but as this change is found as necessary in animals whose blood is not red, as in those in which it is, so we have every reason to suppose that an alteration of a more important kind is effected, which consists in the absorption of a

and communicated it to another, by inoculation. Transfusion of the blood of a mangy dog has also produced mange in another. Many similar proofs might also be brought forward to establish the fact, that the fluids, as well as the solids, may be primarily and specifically affected. Neither does the argument, that the universal presence of the blood in every part, were it in itself affected, ought to produce general and not local disease, stand its advocates in better stead: for, by laws framed by the Great Architect of the machine, every disease has its particular seat, and almost every poison its preference: the mange affects the skin; grease the heels; glanders the mucous membranes of the nose; and farcy the superficial absorbents.

vital principle, from whence springs the fountain or source of animal heat*.

The *production of animal heat.*—Few subjects can be considered more interesting to the veterinarian than to ascertain the source of animal heat. To be able to regulate it to the preservation of health, or to learn how to diminish it in acute or inflammatory affections, or to increase it in chronic or indolent ones, are objects worthy his utmost attention. Any thing beyond the slightest summary of the doctrines, on which the theory of vital heat is formed, would exceed our confined limits: but as, in a practical point of view, the subject is most important to the veterinarian, I would recommend it to his fullest attention†. A consideration of it may be properly commenced by examining the atmospheric air which is breathed, and which, in the present advanced state of knowledge, we need not inform, even the tyro, that it is a compounded element, remarkable for two properties, the supporting of respiration and combustion. Although air may exist, yet, when it will not support either of these phenomena, it is invariably found unfitted for the other, which affords ample proof that it has parted with some property or portion. From innumerable chemical proofs, this portion is known to be oxygen, of which twenty-seven parts in one hundred exist in good air. In impure air, it enters in various proportions, till it becomes first hurtful, and next fatal, as it possesses more or less of this principle. Oxygen holds within it caloric, or the matter of heat; but it holds it in a latent form‡, and this caloric, or heat, it parts from by

* Innumerable facts may be brought forward to prove, that some important alteration is effected in the blood in its passage through the lungs. The known difference between arterial and venous, that is between that which has immediately passed through the lungs, and that which has traversed the body, but which blood we know to be all derived from the same source, is a most strong and convincing proof. If a large artery be taken up, the blood in it, which was before florid, soon becomes dark: the veins likewise have the dark blood in them rendered still darker, if its course be retarded or stopped; thus on tying up the neck to bleed, the fluid that first issues, particularly if the ligature have been tight or remained long, is very black; and which occasions farriers to say, "that such blood is very bad;" but after it has continued to flow, it becomes more bright, as having been less under this suspension, which is then said to arise from the horse "having parted with his bad blood." It is likewise usual, when blood trickles down, to see a florid and dark stream; the florid part arising from some of the capillary branches which have not yet been deprived of their oxygen.

† The theory of animal heat may be satisfactorily studied from the chemistry of Dr. Black, or from Crawfurd's celebrated treatise on the subject. From the very able work on suspended animation, by the ingenious Professor of the Veterinary College; as well as from the treatises on Physiology, by Richerand and Magendie.

‡ That caloric, or the matter of heat, exists in most bodies, as well in those which feel cold to the touch as in those which do not, we know from the circumstance of friction which produces heat between the coldest substances. In such case, before the friction, the heat equally existed, but it was then in a latent form. The action of friction has evolved or let loose the caloric, but in a sensible state.

means of some chemical combinations it forms in the lungs, and imparts it to the blood; but not now in its latent, but in the form of sensible heat, and which heat is subsequently distributed, by the circulation of the blood, to all parts of the body. The air which is afterwards expired, ought, from these principles, to be altered and unfitted for either respiration or combustion; and that such is the case we are fully aware, from innumerable proofs*. Such at present are the received opinions relative to the chemical changes which the blood undergoes, and to the source from whence animal heat is derived. They have long maintained their ground; and being formed on experiment, and confirmed by numerous collateral facts, it is probable that they will not be easily overturned. It is, however, necessary to remark, that there are yet considerable difficulties in reconciling this doctrine with the numerous phenomena observed, and which has led to attempts at accounting for the evolution of animal caloric on other principles. Among the sceptics to this theory, Mr. Brodie stands conspicuous. His experiments have been very numerous, and from them he infers, *that animal heat does not depend on the chemical changes which the blood undergoes in the round of circulation, but that the nervous system seems more particularly concerned in its production;* for he alleges, and others have noted the same, that, by impairing the nerves of any part, the formation of animal heat in that part is impaired in proportion to the injury done to the nerves, although the circulation be continued perfect. The experiments of Mr. Dulong likewise go to prove that the quantity of the matter of heat disengaged by the conversion of the oxygen into carbonic acid, is greater than can be accounted for by the fixing of such oxygen during respiration; and therefore that some other source of calorification must exist in the blood.

ANATOMY OF THE ABDOMEN.

Of the Abdomen generally.

THE external parts of the abdomen, or belly, are the common integuments; the abdominal muscles; the parts of generation in the horse, and the mammæ in the mare. The internal parts are the visceral investures, and the viscera themselves, which may be divided into the *chylopoietic,* the *urinary,* and the *sper-*

* Under this view of the effects of air in respiration, how many important facts present themselves, and how necessary it is to the health of our horses that we allow them only pure air to breathe. That which has been breathed and re-breathed in crowded and unventilated stables, must necessarily be deprived of a portion of its oxygen, from whence only animal heat and muscular vigour can be derived. Such air, in addition to the carbonic acid gas, evolved by the process of breathing, is still further deteriorated by ammoniacal gasses let loose from the surrounding matters. When, therefore, thus confined in the narrow limits of close unventilated stables, are the properties of durability, vigour, and capability of resisting disease, to be expected from horses so treated? (See *Stable Management*, p. 73.)

matic, with their several appendages. The first class of internal parts is by far the most extensive and numerous, comprehending the stomach, intestines, mesentery, liver, pancreas, spleen, thoracic duct, and omentum. The second takes in the kidneys, renal capsules, ureters, bladder, and urethra. The third comprises, in the male, the vasa deferentia, vesiculæ seminales, testicles, spermatic cords, and part of the penis. In the female, the urethra, vagina, uterus, and ovaria. The abdominal cavity is much the largest of the three great hollows of the body; forming, when its contents are removed, an extensive oval vault, which is bounded anteriorly by the diaphragm, posteriorly by the bones of the pelvis, superiorly by the vertebræ, laterally by the ribs, and inferiorly by the abdominal muscles. The superior part is called the back, the lateral parts are the sides and flanks, the posterior the loins, and the inferior portions throughout are called the belly. These divisions being indeterminate and more appropriate to the exterior than to the interior parts; others have been formed by imaginary lines, in which the cavity is artificially divided into what are termed *regions,* which having become arbitrary, and very generally received, as greatly aiding the description, are therefore essentially necessary for the veterinary surgeon to make himself familiar with, as well as what viscus or viscera are contained in each; as, in the event of a wound in the abdomen, this knowledge will enable him at once to determine what part is likely to be injured, which will assist him, not only to form a more certain prognostic, but also more effectually to combat the dangers that may arise therefrom. These compartments, or regions, begin at the anterior part of the belly, which forms the epigastric region, extending from the ensiform cartilage to the boundaries of a perpendicular line drawn immediately behind the point of the last false rib, and which line reaches to within four or five inches of the umbilicus, or navel. The epigastric region admits of minor divisions, forming the lower portion, included between the ribs into the *scrobiculus cordis,* and the parieties of the division into the right and left hypochondria. The central portion of the belly forms the *umbilical region,* which commences four or five inches anteriorly, to the navel; reaches also so much posteriorly to it; taking in the portion that two transverse lines in this direction would form; that is, from one anterior spinous process of the ilium to the other: the lateral and superior parts of this are termed the *lumbar regions.* The *hypogastric region* extends from the posterior limit of the umbilical region, over the rest of the abdomen, and forms laterally the iliac regions, or flanks: the middle part is called *regio pubis.*

The *relative situation of the viscera within the regions,* it has been just stated, is of much practical importance, particularly as aiding the description of parts; and as such we shall take a cursory view of it. The large intestines occupy the whole inferior portion of the cavity of the abdomen, and consequently occupy all the lower regions of the belly, as well as a considerable portion of the laterals. The apex, or cul de sac of the cæcum, protrudes its large blind end along the right side of the abdomen to the diaphragm, encircled almost by the circumvolutions of the colon. It is thus that a cow's horn, a hedge stake, or any other wound which penetrates any part of the lower marginal half of the abdomen, is sure to protrude some portion of the large intestines. In the horned ruminants, such a wound any where not greatly below the median line, particularly on the left side, would more probably penetrate the paunch or first stomach. When the large intestines are removed from the abdomen, the small intestines, which in a natural state lie over them, come into view, whose situation, as regards the regions, is not determinate, but depends on their state of distention and the peristaltic motion. The stomach will be found to occupy the left hypochondriac region when empty, and, when distended, to stretch itself into the epigastrium. (See *Plate* IV.) The liver is attached to the diaphragm in the epigastric region, from whence it extends into the right and left hypochondriac regions, its larger lobes occupying the right of them. (Vide *Plate* IV.) The spleen occupies a space in the left hypochondrium, between the great extremity of the stomach and the left kidney. The pancreas will be found principally in the left epigastrium, while the renal capsules and kidneys occupy the lumbar regions: and the bladder, with the parts of generation, occupy the pubic region in the horse, and both pubic and hypogastric in the mare.

The *peritoneum* is a dense membrane which forms the inner lining of the cavity of the abdomen, as the pleura does that of the thorax: it is then reflected over each of the abdominal viscera, as the other is over the thoracic. It may be resembled to a large membranous bag or bladder shut up; the different viscera being indented into its outer surface, and encircled by it, but by which means they never enter its cavity. Correctly speaking, however, no cavity at all is now left, the protruded viscera exactly filling up all the space, except what is required for interstitial fluid, which aids the free motions of the viscera. This inner surface, as may be supposed, is every where smooth and polished, while the outer, which is adapted to the circumference of the general cavity, and to the viscera, is cellular, and adheres by minute fibres to the parts it covers. It cannot be strictly said to be an universal membrane to either the cavity or to its contents; for it ends towards the middle of the pelvis, leaving the posterior part without at all investing it; by which means also it only includes the anterior and superior portions of the bladder within its folds. With these exceptions, having invested all the abdominal surfaces, it extends itself into certain prolongations, some of which remain within the cavity, and others protrude themselves without it. Of the former kind are the mesocolon, mesorectum, omentum, and mesentery, with those which originally covered the fœtal parts, as the round ligament, but which was originally hollow, and contained the umbilical vein; as were also the two posterior ligaments, so called, which fœtally invested the umbilical arteries and the urachus. Of the outer prolongations of the peritoneum, the principal pass through the abdominal rings, giving a vaginal coat to each testicle. The peritoneum derives its vessels and nerves from the surrounding parts, and is, like them, very vascular, and therefore equally subject to disease. In any acute inflammation of the abdominal viscera, it is generally found inflamed; but pure peritonitis, or distinct spontaneous inflammation of it, is rare. It, however, often becomes so from wounds into the cavity of the abdomen, and sometimes from castration also. Mr. Percivall relates a case of chronic peritonitis, the progress of which, as related, is interesting and curious*. I have frequently seen thickenings and adhesions formed on it after death, in subjects who have been slaughtered, which I attributed to attacks of enteritis. It is to a diseased increase of its interstitial fluid, that we attribute ventral dropsy; but which is rare in the horse.

The *uses* of the peritoneum are not only to protect the abdominal contents, but also to keep them relatively situated towards each other; at the same time by the smoothness of its surface, and by the fluid it secretes, to allow free motion between them. It is wisely formed very elastic, which is evinced by the effects of pregnancy, of increased fat, and from dropsy: in all which cases it accommodates itself to the distention, and, on the removal of the distending cause, soon regains its original size.

The Omentum.

The *omentum,* or *cawl,* is a double membrane, formed from folds of the peritoneum, two of which are derived immediately from the stomach, and two are formed from the mesenteric lamen reflected from the intestines. Within these duplicatures, adipose nodules are dispersed, but in small proportion in the horse to many other animals. In the hog, for instance, as soon as the abdomen is opened, the omentum presents itself, spread over the whole contents of the belly. In the ox and sheep also, the principal fold alone incloses the four stomachs and duodenum: but in the horse it is small; and from its attachments to the great curvature of the stomach, it extends so as to do little more than cover that part of the pancreas, and a small portion of the colon to which it is also attached. (Vide *d, g, Plate* IV.) Thus the horse is not subject to the species

* Lectures, vol. II, p. 402.

of hernia, or rupture, termed epiplocele, to which some other quadrupeds are liable*. The uses of this fatty membrane are not yet certainly known; it has been supposed to be for the purpose of lubricating the intestines, and to serve as a medium to prevent the effects of motion; and this opinion is much favoured by its appearance in many animals: but when viewed in the horse, and some other of the brute creation, whose quick movements would seem to require such an oily medium, it must be allowed that this cannot be its principal use; for were it so, it would probably be as large in the horse as in the dog, who is equally an animal of speed. Neither can it be altogether as a depôt for animal oil, otherwise in every quadruped of quick digestion it would be found equally large.

The Stomach.

The *stomach* is so important an organ, that by the antients it was regarded as the seat of the soul, and its presence was considered by that great physiologist, Mr. Hunter, as the grand distinctive mark between animal and vegetable life; though we now know, that the existence of a stomach is not an invariable mark of the animal, nor does its absence incontrovertibly prove a vegetable origin. In the horse there is but one stomach, which is so small, compared with his general bulk, as perhaps to afford no parallel among quadrupeds. It is, however, notwithstanding, capable of very great extension (morbid distention), having been found with upwards of forty pounds of undigested hay within it. In structure it is partly membranous, partly muscular, and partly cuticular; with a figure, that, when distended, has some resemblance to a bag-pipe. (Vide *d, Plate* IV.) It is situated immediately behind the diaphragm, in the left hypochondrium, and in part of the epigastrium, with its expellent orifice stretching across the spine to the right side. It has two surfaces, which may be called its sides, though one is posterior, and the other anterior. It has also two extremities, the larger of which is directed towards the left false ribs, and forms its *fundus*, and a smaller, which, after a slight curvature which carries it posterior to the larger extremity, forms the pylorus. Its curvatures are a large one, to which the spleen is attached, and a smaller formed between its openings. It exhibits a cardiac or recipient orifice, near the centre of the lesser curvature, and a pyloric or expellent outlet, forming the right or small extremity. In *Plate* IV, the pyloric orifice is distinctly seen; the cardiac is hidden by the stomach, but is nearly opposed to the letter *d*. Thus when the stomach is moderately distended, it lies in an obliquely transverse direction, with its greater extremity projected a little forward, and its two orifices

* Dogs not unfrequently have epiplocele, to which their tendency to obesity renders them still more liable. In the hog, whose abdominal rings are equally unclosed and his fat equal, it is, however, very rare, for his exertions are less.

superiorly inclined, but the cardiac the most so; having the lesser extremity rather posterior to the other, and the great curvature inferior, and perhaps a little posterior. It is evident, however, that its situation must vary much according to the degree of its distention: the foregoing description will therefore apply to it only when moderately filled; for when greatly distended, the left extremity will press upon the diaphragm, and the right will be carried posteriorly, so as to displace some of the other viscera. From a very distended stomach pressing upon the diaphragm, we are at no loss to understand why breathing is impeded after an inordinate meal; or why a horse, in such cases, appears to breathe with quickness and great effort, if moved quickly; for he is forced to make use of his intercostal muscles, the muscles of the shoulder, and those of the fore extremities, to open the chest; its distention backward being prevented by the pressure of the stomach upon the diaphragm: hence likewise we see the great impropriety of galloping horses, after watering to their fill, "to warm it in their bellies," as it is foolishly termed; and also that it is unwise to ride very hard after the stomach is over distended with food. Moderate distention the horse bears better than most animals, as will be seen. The stomach has externally a covering from the peritoneum, which adheres closely to it, by means of its cellular portion; and which appears to dip in between the muscular fibres. Its next portion is muscular, and which in the horse is so considerable to give him some gastric speciality, as we shall further notice. The direction of the muscular fibres is various; but they may principally be referred to a longitudinal and a transverse order, though neither of them are regularly so, but are intermixed with others, whose direction is more oblique. The longitudinal plan is the most external (*vide c c, Plate* V), and appears a continuation of the outer one of the œsophagus, with some original fibres, which, spreading over the lesser curvature, carry themselves obliquely around, and likewise over the great extremity, or fundus, where they conspicuously form themselves into a kind of vortex, whose centre is in the middle of that extremity. The inner, and by much the largest plan, is not quite circular, but is slightly oblique, crossing the obliquity of the longitudinal plan. The circular layer is very thick and strong around the cardiac or recipient orifice (*see Plate*); and if it do not form a true sphincter, it must certainly, by its contractions, tend greatly to prevent regurgitation, and there is little doubt that to this formation, in a great measure, may be ascribed the inaptitude and almost incapability of the horse to vomit. This difficulty is also further increased by the rugose folds of the cuticular lining of the œsophagus, which is here thrown into plicæ, which, although it cannot be said to form a complete valvular apparatus, yet must prove a resistance to regurgitation*. It is evident, on a due consideration of this matter, that should the circular and longitudinal fibres act from the pylorus to the cardia by any irritation which might produce an effort to vomit, the circular and longitudinal fibres of the cardia being infinitely stronger and more numerous, would shut this orifice: for as muscular fibres exist throughout the organ, by which its motions are effected; so it cannot arise simply from the existence of the cuticular covering to the first portion of his stomach, that he cannot vomit, as it is but reasonable to suppose the fibres act throughout the whole by the common consent of parts; nor do they of actual necessity want an immediate stimulus to their muscular surfaces: for were such the case, the fibres of the œsophagus would not, by the presence of the masticated bolus, be stimulated to contract through the cuticular coat, which equally here lies over the fibres: nevertheless, the cuticular coat of the stomach is probably an assistant in this difficulty to regurgitate, by lessening the liability to nausea; and as vomiting is only an effort to remove the cause of nausea, so the disease being here unnatural, Nature has not provided the means for its removal: for though, as we have often before hinted, she will be always found naturally equal to her wants, yet she will never be found to be superfluous, or to extend them. Vomiting appears to arise from an inversion of the peristaltic motion of the stomach, which motion, in its natural state, begins at the cardia, and ends at the pylorus; but in a reversed state, it commences at the expellent, and ends at the recipient orifice, thus regurgitating its contents. But there is reason to believe that the horse and other herbivorous monogastrics, as they are called, experience but little antiperistaltic motion from the peculiar form of the stomach, and particularly from the manner of the implanting of the œsophagus in the stomach, which in these tribes is found to be in the centre of the lesser curvature, and not far distant from the pylorus, thus leaving a large gastric pouch, called the fundus*.

If such peculiar form of stomach throw an impediment in the way of vomition, it is an additional proof that the structure generally has that tendency, from the common uniformity which is observed in all structural parts designed to one great end: but without this peculiarity, the cuticular covering of the stomach of the horse may tend to lessen the effects of an inverted peristaltic motion in its upper and recipient portion. Vomit-

* A valvular apparatus to the cardia of the horse's stomach has been altogether denied by some comparative anatomists and veterinarians; but that an impediment of the valvular kind does exist, a close examination of the parts will shew. M. Girard, who has paid particular attention to this subject, notices the same in his "*Anatomie Veterinaire*."

* Memoire sur le Vomissement contre Nature dans les Herbivores Domestiques, par J. Girard.

ing is, therefore, altogether unnatural to the horse, and the formation of his organs evinces the intention of Nature to be such, but no impossibility exists to the act itself, neither to the state of nausea which is the usual precursor to it; for both have occurred sufficiently often to make their capability notorious*; but in every instance they are forced.

The inner covering of the stomach is composed of two portions, a cuticular and a villous. This species of *cuticular* covering to nearly one half of the stomach is peculiar to granivorous, or such animals as appear destined to live on grain, as horses, asses, rats, and mice; and which forms it into a third species of stomach, between the true membranous one of graminivorous animals, and the muscular of the carnivora, and uniting in a certain degree the solvent power of the membranous stomachs of the ruminants, with the triturating gizzard of those animals, as fowls (which it also imitates by taking in seeds), which require some speciality to make up for the want of teeth. For the horse has not the means of remastication, as in oxen or sheep, nor does he in many instances perhaps masticate his food at first sufficiently to comminute it: the wants of the constitution requiring in him a quick renovation, he is apt, in many cases, to devour his food greedily and hastily: if, therefore, he had not some other structure than the one common to stomachs in general, his food would not be sufficiently digest-

* A horse in Sussex was seen to regurgitate a large quantity of grains, both by the nose and mouth. Mr. Percivall, in his Lectures, p. 424, vol. II, relates a case of a mare labouring under gastric tympanites, or hoven, which twice vomited the medicines given to her, which returned both by the mouth and nose. That it should appear by the mouth as well as by the nostrils, is easily accounted for: notwithstanding the natural impediment formed in the pharynx by the extent of the velum palati (p. 226). By the consent of parts, and by a morbid sympathy, all the phenomena are frequently reversed, and even physical impediments are, in such cases, removed: thus a forcible displacement may take place by a convulsive effort, which, if voluntarily effected, or under ordinary circumstances, would be impossible; or if effected, fatal. In the Veterinary College of Copenhagen, it is said, that vomiting was produced in a horse by placing the root of white hellebore (veratrum album) under the skin. That horses are frequently nauseated, and even make efforts to vomit, is sufficiently familiar to every veterinary practitioner; and various substances are capable of producing this effect: most of the mineral acids do it; drastic purgatives likewise do the same; and even small doses of aloes nauseate some horses remarkably, as is indicated by their disinclination to food and water, restlessness, with shifting of the head; and when it is excessive, the mouth becomes moist, and ropy mucus hangs around it. To nauseate a horse is now so well understood, that it is the practice with many veterinarians purposely to excite it, persuaded that it has the same effect in the lessening inflammation in the horse as in the human, by reducing the force of the circulation, and by promoting a relaxed state of the vessels of the skin. This part of the subject will be resumed when we treat on inflammation. Many vegetable substances, as henbane (hyoscyamus), nightshade (belladonna), wolfsbane (aconitum), tobacco (nicotiana), with many others, I have witnessed to have this effect in various degrees; but which effects are not always commensurate with the expectations one might be led to form from their nauseating properties on other animals, or the general phenomena they produce.

ed; particularly as much of his nutriment is dry and hard, and the stomach small; against the effects of which this cuticular coat, it would appear, is formed, as its insensibility allows it to press in a small degree upon the food, and perform a slight trituration on it. This cuticular coat commences with the mouth, and extends down the œsophagus, and is continued over nearly the first half of the stomach, covering its fundus, or pouched left extremity, and ending abruptly by a sort of fringed termination, in a serpentine line, very distinct from the next coat, over which its irregular edges are seen to lap by a slight rugose fold. (See *Plate* V.) This insensible tunic is thrown into plicæ as it proceeds through the œsophagus, to admit of the distention of the alimentary tube. These folds are continued into the cardia, and in a less regular manner also over the remainder of the cuticular surface, making it slightly rugose. (*Vide Plate* V.) It is whitish in colour, and perforated with secretory mucous openings, from whence a gastric secretion, undoubtedly necessary to digestion, probably as a diluent, is poured out. It is to this coat of the stomach that bots are so frequently found adhering.

The *villous, or sensible portion,* though it occupy more of the length of the stomach, yet, perhaps, in real extent, it extends over little more than half of its surface; appearing to commence from the line of termination of the cuticular part. It is very vascular and with much firmness, is yet exceedingly fine in its texture, and, when attentively examined, presents villous processes, from whence its name of tunica villosa, or velvet pile. Its fine villi are probably made up of the minute ramifications of blood vessels, from whence the gastric juice is probably secreted. This coat being more extensive than the muscular, is, when the stomach is not distended, thrown into waving folds, by which it suffers no injurious pressure when the stomach is filled, but can easily accommodate itself to the elasticity of the other investures. (*Vide d, Plate* V.) The villous rugæ are largest towards the great extremity, but towards the duodenum they lessen, and at the pylorus their folds form a valvular apparatus, to prevent the return of the food, as well as its too early exit. These prolongations of the sensible and secreting portion of the stomach not only hinder the too speedy passage of the food, and by which means the gastric juice, or mucus, is more certainly applied to all the parts; but the principal end appears to be to increase the secreting surface, which is here essentially necessary*, seeing the horse's stomach is but

* The gastric solvent juice is, however, not derived from the same part of the stomach in all animals. In some, it appears formed from minute simple glands, variously situated; in others from botryoidal, or lobular ones, and which are placed in some at the base of the gullet, in others within the cardia; and again they are found in a third species confined to the pyloric portion; while in the horse they are divided over the extent of the villous surface: nor is it altogether improbable but that the orifices of the cuticular part assist

the one half of it a secreting organ; and hence these folds are in him more extensive than those of the human. We here likewise see the utility of the saliva; for were the food to pass into the stomach dry, or nearly so, the gastric juice, being but a mucus, would not pervade all its parts, but would be lost upon some of them.

The stomach, as a secreting organ, is very plentifully supplied with blood from three considerable arterial trunks, called the gastrics. One, and sometimes two of these, are derived from the aorta, to furnish the lesser curvature. The right and left gastrics are sometimes furnished by the hepatic and splenic, and sometimes by the pancreatic artery. The vasa brevia are also minute branches given off from the splenics. The blood vessels proceed in a tortuous direction, to avoid the effects of distention; and in accordance with the same end, is returned by gastric veins which possess no valves to impede its return towards the vena portæ. The nerves are supplied by means of an appropriate and important pair called the par vagum, or eighth; which, by means of ganglia formed from the intercostals and sympathetic, unite the stomach in one sympathetic union with all the principal viscera of the body, and from whence result some of the most important phenomena observed in the animal machine, both in health and under disease.

The *diseases of the stomach of the horse* have been thought not numerous or important, from the circumstance of there being so large a portion of insensible surface to it. But such an opinion, grounded on a consideration of the stomach being more a triturating than a solvent organ, has proved erroneous: for although it presents some likeness to the triturating properties of the one, it is infinitely more allied in secreting and solving properties to the other; and as it owns all the vascularity and complexity of the latter, so it is heir also to all its diseases. In fact, a more extended acquaintance with the veterinary art, informs us that the stomach of the horse is more often fuctionally deranged than that of most other quadrupeds; at which times its extensive sympathetic connexion with the liver, the kidneys, the intestines, and whole alimentary canal, vary the diseases, of which its immediate derangement are the consequence, into a vast list. The skin also participates in this sympathetic affection to the full as much as the internal organs, and which also helps to vary the diseased appearances to infinity almost. Neither is this to be wondered at, seeing the life of art, to which we subject the animal, is, in general cases, so diametrically opposite to Nature's intentions. A mistaken opinion relative to the capability of the horse's stomach to resist the action of potent articles, has also led to great abuses in the practice of farriery; and even at this time, medicaments

in the formation of a solvent, for the particular quality of food usually found there.

of too potent a nature are ordered by practitioners, who have surely scarcely reflected on the derangement which a few drams of aloes will produce, because they see that two ounces of tar tarised antimony, or the same quantity of acetate of lead, have failed to produce any serious disturbance in the system. This error has crept into the practice of the world at large, with regard to the horse, and nothing is thought too strong for him, because few animals are so strong as a horse: but he is equally weak and delicate with the lady who rides him, in his liability to disease, and the functions of his stomach are to the full as easily deranged. The diseases of the stomach may be divided into the *acute* and *chronic*. The acute are gastritis, or idiopathic inflammation, which is a rare occurrence: it has, however, taken place; but the gastritis brought on by poison is more common. (See *Poisons*). The stomach is also the subject of two specific acute inflammatory diseases; the one arising from rabid virus; the other caused by, or accompanied with distention, called hoven. Consequent to this, what Mr. Clarke calls "chordapsus," or ruptured stomach, sometimes occurs. The chronic diseases of the stomach are frequent and varied; and are apparently sometimes caused by other affections, as those of the skin, kidneys, head, &c., acting secondarily on the stomach, and primarily when derangement of the stomach produces derangement in other parts. (See *Condition*.)

The Physiology of Digestion.

If a physiological inquiry into the aerating organs and their various phenomena be as interesting and important as we have endeavoured to prove it to be, surely a similar attention to the digestive organs and their functions can be no less so. Digestion may be characterized as that wonderful power whereby substances received into the body lose their own properties, and become endowed with those belonging to the constitution in which the assimilation is carried on. That this animal conversion takes place within the stomach has been always allowed, but in what manner it was brought about was formerly a matter of much debate. Heat, putrefaction, friction, and fermentation, have successively been considered as the principal agents in digestion. But the experiments and inquiries of Spallanzani, Reaumur, and Hunter, have given a much more satisfactory elucidation of the matter; and digestion is now very generally considered to be a process of *solution* by the agency of a fluid secreted within the stomach, and thence called the gastric juice or fluid. The various actions of an animal body produce a waste of the fluids, and even of the solids, and something like a want of tone in the moving powers: these are indicated by the sensations of fatigue and hunger. To restore the tone of parts, rest is required; and to repair the waste, food becomes necessary. As an excitement to the taking in food at proper intervals, the horse is subjected to a sensation well known, but philosophically undefined, called hunger. Hunger and thirst certainly in part originate from the stomach becoming empty, as well as the chyle exhausted; and that a certain degree of distention is necessary to the well being of the stomach, we learn from the fact, that the distention of a draught of water will for a time allay the sensation *. Mechanical distention, however, produces only a temporary relief, but will not repair the waste of chyle, and therefore, when repeated, it ends in general prostration of strength. Neither can hunger arise from the attrition of the rugæ of the stomach against each other; for if it did, it would necessarily be constant when the stomach is empty, which we know not to be the case; but, on the contrary, long fasting produces paroxysms of hunger, which alternate with comparative ease; and in sickness, although an uneasy sensation may be present, yet hunger sometimes does not visit the patient for many days. It cannot arise from any immediate action of the gastric fluid upon its substance; for independent of the reasons which we have for considering that this is formed but in very inconsiderable quantities, when the presence of food does not exist, we know that it acts only on dead matter. Thirst differs principally from hunger, by its excitement to receive liquid instead of solid ingesta. It, however, is more apt to be morbidly excited than hunger, as we witness by the effects of fever and salt provision. It appears a sympathetic want of the stomach to dilute the food individually, and the secretions generally †. Hunger and thirst, therefore, can be only satisfactorily explained by considering them as properties in the stomach by which it sympathizes with the wants of the constitution ‡: and hence it is, that food taken in invigorates, even before it can be digested; and hence likewise will appear the propriety of giving but little food to our horses, and that frequently, when we travel quick and to long dis-

* Wolves are said to eat mud when very hungry, to stay their appetite, by the mechanical distention of the stomach; and it is probable it is more for this purpose than absolute nutriment, that the Indians take in steatite mica, clay, and other inorganic substances.

† Many circumstances tend both to increase and to diminish hunger, but which may be all referred either to the state of the stomach individually, or to its tendency to sympathize with the body generally. Cold air applied to the skin, stimulants as spicy cordials, and moderate doses of mineral and vegetable astringents; the sight of food, or the sound of the preparation of feeding other horses, act on the stomach immediately; while warm clothing, heated stables, diverted attention, and great quantities of water, lessen the sensation; from which facts many practical hints may be drawn, which our limits will not allow us to detail.

‡ It would appear that solid ingesta are necessary to the condition of the stomach and its healthy action, since the experiments made to support animals on liquid aliments alone have not succeeded; at least, not sufficiently so as to establish the fact that they can be readily so supported.

tances, that we may not overrate the power of the stomach; and which caution is more particularly requisite in weak constitutioned horses. That this sympathy between the stomach and the body generally is great, we know, by the prostration of strength that is felt on an empty stomach; and which cannot arise from inanition only, but from sympathy also; for let a tired horse hear the hounds, and he will go on through a long chace with alacrity; but when the melody of the dogs is over, the attention is no longer engaged, and the sympathy returns. Stimulated, therefore, by this sensation, animals are induced to take in such particular food as their organs are fitted to the assimilation of; and to which they are directed both by instinct and by taste. The carnivorous tribes are prone to take in flesh, by their love of it, and they have organs capable of the assimilation of it. The horse has a disposition to take in grain, for he has a mechanism calculated thereto: the ass, the rat, and the mouse likewise. But we must not be misled by a false but favourite theory which had crept into physiology; that the powers of the stomach were necessarily confined to assimilation of nutriment from matters which appear, *à priori*, calculated for that purpose. It is true, that the distinctions between carnivorous, granivorous, and omnivorous, are justified by an examination and comparison of their organs of chylification, commencing with those whereby they obtain their food, those by which they perform the manducation of it, and the peculiarities of the alimentary track it passes through, during its conversion into chyle. These all evince the intention of Nature to sustain life more readily, by the adherence to such aliments as their organs are evidently designed for. But life, happily for all these, can be supported by food not naturally intended for them: and it is found that the stomachs of the carnivorous tribes can, when pressed by necessity, perform the office of animalization of vegetable food; as those of the herbivorous can support life by animal matter*. The stomach, therefore, is by Nature kindly made an organ of adaptation, and can, when absolutely necessary, convert into nutriment most of the matters around them†. This great work of con-

* The Arabs are fond of feeding some of their favourite horses on milk. Many of the Indian tribes give their horses flesh; while those on the sea-shore occasionally feed theirs entirely on dried fish. At the Veterinary College, a horse was supported some time on animal matter alone. Granivorous birds, as pigeons, &c. have been brought to live on flesh, and to prefer it to any other food; and the piscivorous otter, in a state of domestication, will live and thrive on potatoes. Eagles, falcons, and owls, have been experimented on by Spallanzani and others, and were found to subsist on pure vegetable matter, without much alteration of condition or strength.

† The inhabitants of Great Britain are, few of them, aware of the substances necessarily used by their less fortunate fellow-creatures who inhabit rigid climates. Even in Germany, numerous publications have appeared to direct the process of making bread from the ligneous fibres of the beech,

verting the organic vegetable matters around the horse, after he has received them into his stomach [the process by which it is carried there, has already been described, p. 233], into nutriment, appears to be operated, in the first instance, principally by a solvent power, in a fluid secreted by itself. This *gastric juice* effects this by a specific agency, for it appears to own no chemical properties of a solvent nature*: no acid or alkali has yet been discovered in it (*per se*): it acts solely by a living power; and so far from its fermenting substances, it is proved by the experiments of Spallanzani, Hunter, and others, to arrest fermentation where already begun. By the decisive experiments of the same physiologists, it is also proved to have a preservative quality, instead of a putrefactive one†. Its powers, therefore, are independent of all these and other agencies formerly attributed to it, and are derived from a living principle within itself, which enables it to act on organic matter, but which, it is necessary, should be first cut off from life, for life has a particular power to resist its action; hence bots, and other worms, are not, while living within the stomach, digested, but, when dead, they become dissolved like other matter: and it is in this way, that this juice has been found to operate upon even the stomach itself after death. The food, therefore, acted upon by the gastric juice, is reduced to a pultaceous mass, called chyme, and which is found streaked with a white fluid, which is the true *chyle*. In this state it passes into the intestines, but more quickly and probably less perfectly digested than in most other animals, that it may be hereafter further acted upon. For the digestive economy of the horse dif-

birch, lime, poplar, elm, and fir, which are ground fine and kneaded with water into bread. Many savages subsist on the larvæ of insects, and others, we are informed by Humboldt (" Tab. Phys. des Régions Equatoriales"), feed on a fat unctuous earth.

* An acid is certainly produced, but it exists not in the gastric fluid, until it have operated some chemical changes on the matters around. It coagulates milk, as we know by the rennet in the digesting stomach of the calf; but this is a peculiar property so inherent, that even maceration and drying will not destroy it. It is rather the depriving the milk of its life, for, after having coagulated it, it again dissolves it, and converts it into nutriment. A morbid acid is often formed, but this stops the process of digestion; and the healthy action also tends to form an acidifying principle; but whether carbonic, acetic, or phosphoric, is undetermined. It is, however, of a volatile nature, as its effects on litmus paper are temporary.

† The existence of an antiseptic power has, however, been questioned by M. Montigre, whose experiments went to prove that the gastric juice was in properties and qualities similar to saliva, and putrefied as readily. But the mode of conducting his experiments was not such as to tend to shake the established opinions. Happy also is it for animal life, that the stomach has a capability of resisting putrefaction, otherwise aliments in this state would infallibly destroy: the smallest possible portion of morbid matter introduced into the blood, produces fatal symptoms of putridity (another proof that the blood itself can become diseased): but hecatombs of morbid matter are eaten by the carnivora with impunity, and the edibles of the herbivorous are not unfrequently in a state approaching to it.

fers from that of other herbivorous animals, and, *à priori*, we might be led to expect it*. He is a very bulky animal, yet he is one endowed, as has been happily expressed, with a specific

* The diversity of means in accordance with the speciality of the organs, by which the same great end is produced, is admirably exemplified in the digestive process. In some of the lower orders, as the polypus, the animal appears one gastric cavity. The organs become more complex as we ascend in the scale. In carnivorous birds, the œsophagus terminates in an ingluvies or crop, but which is smaller and less muscular than in those which live on grain: in some of them it is said to be wholly wanting, and in others it is little more than an enlargement of the alimentary canal, the whole tract of which is altogether shorter than in the herbivorous fowls, and they have no intestina cæca. In granivorous birds the crop is large, very muscular, and internally lined by a powerful cuticular coat; for as these animals have no teeth, the action of comminuting the hard food taken is performed by the stomach, which in this kind acts mechanically, and so powerfully, as to grind even glass to powder, and to reduce balls stuck full of iron speculi to plane surfaces. In carnivorous quadrupeds the stomach is also small and muscular, and the alimentary track short; but in the herbivorous, on the contrary, the gastric capacity is much larger, and the intestinal track long. In the graminivorous and ruminants, the gastric cavity is multiplied into as many as four stomachs, as we find in the camel, ox, sheep, and goat. The first of these stomachs is the true ruminating organ called the paunch, and is a mere membranous receptacle of immense capacity, reaching, when distended, as far as the ilium towards the left side. Into this the food is passed as soon as gathered, without mastication. The second stomach, known as the reticulum or bonnet, appears little more than an appendage to the former, but is more cellular. Into the junction between these stomachs the œsophagus enters, and is continued in the form of a muscular ridge or tubular portion, into the third stomach or many-plies. This muscular tube forms a leading feature or character in the ruminant economy. It is highly sensitive, and, like the tongue, is capable of diversified motions, and is wholly subjected to the will of the animal, and which is the more remarkable, as hitherto no speciality of nervous communication has been found to exist in it. Segmental as it appears, by the approximation of its sides, it can become a perfect tube, and the animal can thereby direct the grass it collects into the paunch; but the water it drinks is at once passed into the second cavity. When a sufficient quantity of grass is collected to distend the paunch to a certain degree, the animal lies down usually, and rumination begins by means of the same tube, which embraces a portion of the contents of the rumen or paunch; and by a regurgitation, it is passed up again into the œsophagus and the mouth, when it undergoes a complete mastication, and, being mixed with the saliva in sufficient quantities, it is again returned along the œsophagus towards this gastric tube, which has the power of carrying it beyond the two first stomachs into the third, called, from its foliations, the many-plies, of which membranous septa there are between eighty and ninety, by which the secreting surface is much increased in extent. The faliseus or red bag forms the fourth stomach; and although there is no doubt but the process of digestion is begun in the third, yet it is in this that the pultaceous mass undergoes its perfect animalization, by mixing with the true gastric juice, which is secreted here only, and thus, it is this stomach alone which produces rennet. In the hornless ruminants, the second stomach is exclusively designed as a reservoir for water, and is capable of holding in some of them, as the camel and dromedary, a vast quantity, and which is passed up as wanted, to be mixed with the dry matters chewed during rumination, or during the deprivation arising from their arid climes. This aqueous reservoir is the means of saving human lives occasionally in Arabia; for travellers, when famishing with thirst, are sometimes obliged to destroy their camels, to furnish themselves with the water from their stomachs.

energy: he is capable of vast and of continued exertions, and his celerity of motion is so little accordant with his bulk, that he is one of the swiftest animals known. To him, therefore, the bulky gastric cavities of the ox would have been most inconvenient and hurtful; and yet being intended for greater exertions and increased celerity, it is equally necessary that his consumption of food and absorption of nutriment should be great; and these ends, we find, are admirably brought about by a spéciality of structure in unison with all these intentions. Great as is his consumption of food, his stomach is confined to one, and that one is smaller than that of almost any other animal. A horse is capable of eating two pecks of corn, and even more, at a meal, but his stomach cannot, unless morbidly distended, and endangered, hold the half of this; and he will frequently drink two, or even three pails of water, although the stomach cannot contain one. The aliments must, of necessity, therefore, in the horse, be very speedily pressed forward from the stomach into the intestines, very soon after they are received; by which means great pressure on the diaphragm is prevented, and, even under the repletion of full eating, his respiration is not so materially affected as in other animals; nor in him is the disposition to sleep and inactivity after meals apparent, as in them*. This is so marked a feature in the economy and

* In most animals the disposition to sleep after a full meal is considerable: in ourselves it is also common, arising in part from the necessity which the stomach finds of detracting blood from the other organs of the body, to perform its secreting offices therefrom (from whence results also the chilliness felt after eating, and the lassitude); but principally from the mechanical distention of the stomach, which now presses on the diaphragm and impedes respiration; producing thereby congestion in the right side of the heart, and which, in its turn, prevents the free return of blood from the head: the brain, therefore, becomes pressed on, and sleep is the natural consequence. A disposition to sleep after a full meal is therefore a natural, and not a morbid sensation: as it allows more blood to be employed for the purposes of secretion, it may be considered as a salutary one also. But analogy must not deceive us, as it has others; for reasoning thus, on the effects it has on ourselves and some other animals, it has been customary to shut up race horses without light, to encourage them to sleep after their meals. This, however, is extremely erroneous, for in animals destined for much speed and locomotion, as the horse, the stomach is not found so capacious; neither do they suffer so much from distention, and consequently we find that they do not feel the same inclination to sleep after eating which the ruminants do. In them the food is quickly passed into the intestines, where digestion is completed; and with them, therefore, energy and motion are requisite to promote the quick passage of the aliments through the stomach, by making the abdominal muscles to press on the parieties of the belly. In horses, therefore, sleep is neither natural nor necessary after full feeding; but, on the contrary, moderate motion perhaps (but moderate only) rather tends to assist, as much as violent exertion counteracts and injures it. It has been observed by the ingenious Professor of the Veterinary College, that the horse is the only animal who is not injured by exertion, immediately following a full meal. There are, however, other animals who are equally alert. Sleeping after full feeding is certainly favourable to the accumulation of fat in many animals, but perhaps it does not increase the muscular fibre in any. Thus pigs fatten surprisingly when close shut up; stalled oxen do the

habits of the horse, as not to have escaped the notice of naturalists. Still further to enable the horse to keep up his specific vigour, not only the quantity, but the quality of his food, has been studied by Nature; and we find that, by a speciality in his organs, he is not only enabled to extract more perfectly the nutritious particles from farinaceous food, than simply graminivorous animals; but that also he is enabled to retain it within his stomach a longer time than the less nutritive matters he also takes in. Long experience has fully proved that the full energies of the horse are best kept up by a subsistence on the farinaceous seeds of the various grasses called corn, in which substance organic moleculæ (i. e. nutriment) are found to exist in greater abundance than in their more succulent parts, and the speciality by which he does this, is both functional and structural. The functional is derived from the great energies of the stomach generally, the nature of the gastric juice, and the time it remains to be operated on. The structural part of the speciality consists in the form of the æquine stomach, and of a particular covering to the part which constitutes its speciality. It was long ago observed by Spallanzani and others, that the fundus or pouch of the horse's stomach gave it a near resemblance to the rumen or paunch of the ox, &c., and that probably it was destined to the retaining of *particular* parts of the food. By observation and experiment, it has been discovered that the food is really distributed in the stomach, in many animals, according to its qualities; and this knowledge has led to the supposition, which subsequent actual experiment has justified *, that the large pouch-like left extremity of the horse's stomach is intended particularly to receive, and by its peculiar situation (being without the line of regular passage from one orifice to the other) there to retain it, to be acted on longer and more completely than the less farinaceous food. This portion of the stomach is also particularly circumstanced with regard to its *structure*, it being furnished with an apparatus purposely destined to act on grain alone, and giving it some resemblance to the triturating gizzard of birds. This arises from its *cuticular* lining, and which, it must be evident, forms a very remarkable feature in the digestion of the horse, ass, and his granivo-

same; and hence stable keepers and horse dealers closely confine their lean horses; but it is not attended with any accession of either strength or muscle, but of animal oil or fat only.

* Spallanzani's experiments go directly to prove, that when the stomach of various animals contain more than one kind of food, that most easily digested is soonest evacuated. M. Lallemand also observes, that, from his experiments, he has found that aliments did not escape from the stomach in the order in which they were introduced. In ourselves the same fact often presents itself; when edibles are returned from the stomach by vomiting, nearly unaltered, some days after they were eaten, and when the accompanying ingesta has proceeded in its natural course. Mr. Percivall relates two very satisfactory experiments made by himself, relative to this power of separation in the stomach of the horse. (*Lectures*, vol. ii, p. 521.)

rous congeners, the rat, mouse, and a few others. It therefore follows in due order, that we endeavour to ascertain in what way this cuticular insensible tunic furthers all these ends*. It cannot be intended as a mere medium for maceration, although there is little reason to doubt but that some maceration takes place here: neither can it be to furnish a secreting surface, although a mucus is here formed, which assists in the process of digestion, probably; for a cuticular structure is certainly not the most convenient for either of these offices. From these and other corresponding considerations, we are warranted in considering, that, by a gentle motion effected by the vortex of muscular fibre around the fundus, the farinaceous grains are rather triturated against themselves, than ground by the stomach itself, as in true gizzards. By these means the maceration is rendered uniform, and the fluids received are pressed into and throughout the substance of the grain, to reduce it into a perfect pulp, and fit it to be at once acted on, and without further delay, when it reaches the villous portion of the stomach†. I am fully aware that this view of the cuticular lining of the stomach of the horse, as a means of gentle trituration, is not in unison with that of other respectable authorities; but, notwithstanding the respect I would pay to such opinions, I think that the analogy and the phenomena connected with the horse's digestive process, bear me out in my view of this matter‡.

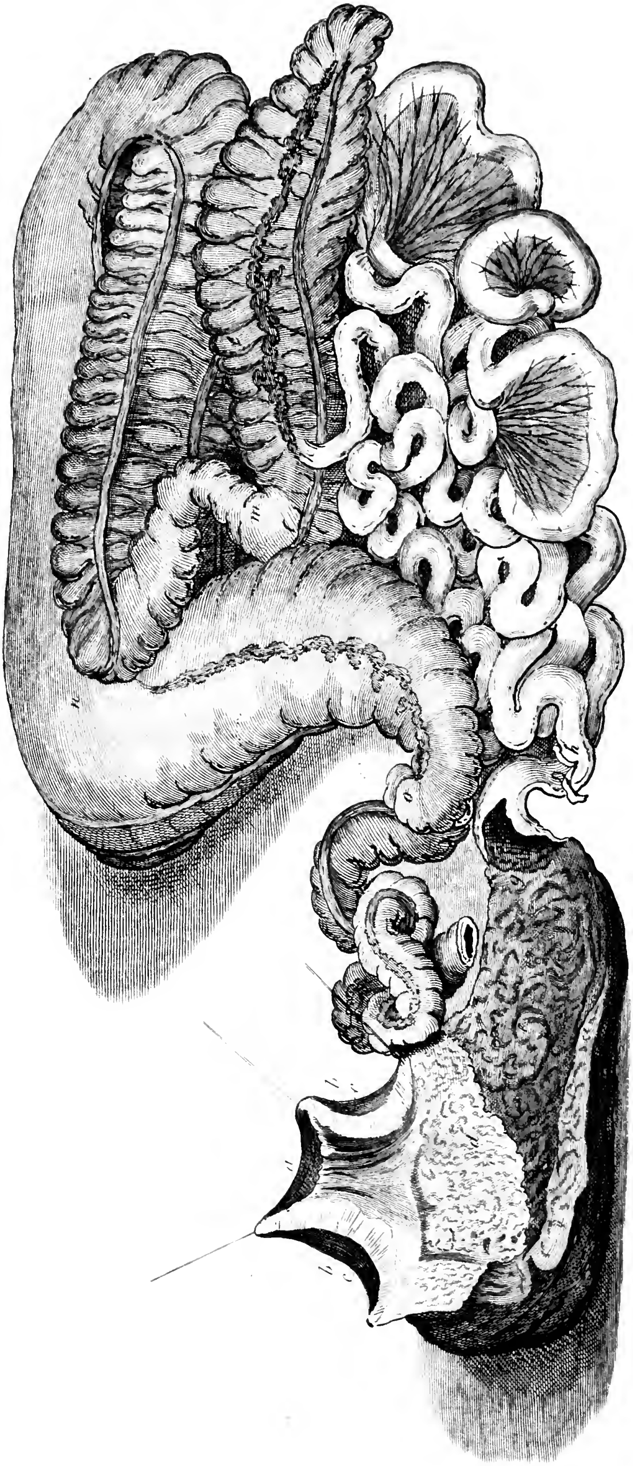
* It cannot be intended, as Mr. Percivall suggests, as a defence to the hard matters taken in; for very pointed ingesta are never received. If a horse be ever so pressed with hunger, so as to eat furze or whins, he first deliberately chews it; and to enable him to do this without pain to his mouth, he stamps on it. Woody tops he also carefully masticates; and that such substances are rendered incapable of wounding even the sensibility of the villous surface, also by especial powers in the stomach, we know from what we take in ourselves. Ground glass, as is often proved by wagers, may be eaten with impunity: dogs are uninjured by bones, and other proofs multiply around us.

† It forms no just objection to this view of the digestive process in the horse, that grain is occasionally passed whole: it is not pretended that perfect trituration is here performed; it is only so performed as to produce a moderate pressure on the contained grain in a measure distinct from, and independent of the peristaltic motion; but which pressure is not sufficient to destroy the actual form of the seed, or to grind its envelopement, but is yet fully sufficient to destroy the organization of the contained farina, and reduce it into a pulp. Neither does it militate against this argument, that grains do pass which are so wholly unacted on as to afterwards germinate, seeing a rapid and incomplete digestion is common to all animals, under some particular circumstances; and here, particularly, a few grains may easily escape the mass, without at all destroying this view of the general action. Trees, shrubs, and vegetables, are every day planted by the imperfectly digested seeds dropped by the dung of birds, who have a real mill to grind their corn.

‡ Mr. Peal, in his excellent work on the diseases of horses, says, "if the insensible portion of a horse's stomach performs the office of a gizzard at all (a fact which I very much doubt), it must be inconceivably small," p. 306. Mr. Percivall is at the pains to combat this opinion at length; but although I allow the ingenuity of his reasoning, I cannot think he meets the matter quite fairly. In his examination, he rather forces an inference that Spallanzani's opinion was, that "the stomach of the horse possesses no triturating power,"

From what has been stated, it is evident that the process of digestion is, in the horse, a peculiar one; and whereas in most other animals it is principally carried on in the stomach, in the horse it is equally conducted by the agency of the intestines, having previously absorbed into the pultaceous mass the gastric juice, which is, however, equally here, as in other animals, probably the most active solvent. A gentle contraction of the stomach generally, and a slight peristaltic motion, but almost confined to the secreting portion, gently forces the food towards the pylorus, mixed with the chyle in a subtracted mass called chyme, and which appears, during digestion, to be constantly passing the valvular folds of the pylorus, but which folds are shut to the remaining undigested matters. The stomach, it has been already remarked, by the ganglionic connexion of its nerves with most of the spinal pairs, is an organ of great sympathy, with the body generally, but less so than the human stomach; for the mind in the horse has little power over it. It is to this cause, probably, that the appetite of sick horses is not so much affected during illness, unless the derangement be extreme. In some instances a morbid hunger exists, and it is not uncommon for sick horses to die eating. Tonic medicines probably act by a sympathetic effect more than by any action on the muscular fibre or secreting surface. Direct cordials unquestionably act in this way. If this subject have occupied more of our present pages than of the last edition, it must be attributed to a conviction of its importance and great interest.

which he grounds solely on the assertion of this experimentalist, "that the horse does not chew the cud, but resembles the ox in the membranous structure of his stomach, and the food upon which he lives." Spallanzani's experiments, also laid much stress on by Mr. P., by no means go the length to disprove a small degree of trituration, or rather of a gentle pressure, independent of the peristaltic motion, which is all I contend for. Had they been intended even to go to prove all absence of attrition brought on between the grains themselves, through the agency of the muscular and cuticular coats, then Spallanzani would not have enclosed food in tubes as he did into fowls. At such times he was experimenting on the gastric solvent, and not on stomachic attrition. Mr. P., in proof of his opinion that the stomach has no triturating power, alleges the muscular structure is not only white and generally weak, but also that it is even strongest at the pylorus than at the cardia. That a want of colour in the muscle is no proof of any want of power, we have innumerable facts to prove. The muscles of fishes and the pectorals of many fowls are both notoriously strong, yet white; and that it is not furnished with very powerful muscular strata I think an inspection of it will disprove, as well as it will tend to prove, that the balance of power rests eminently with the recipient orifice and insensible portion. Having, however, already trespassed on the limits of my pages, I cannot follow Mr. Percivall's arguments against any triturating power in the stomach further, although the subject is well worthy of attention, and his manner of treating it ingenious and forcible. Many well conducted experiments and well authenticated facts must, however, be yet brought forward, before the matter can be fully decided.



Description of Plate V.

This plate represents the stomach and intestines taken out of the body, and placed without any particular order. The stomach is cut open to shew its inner surface, and the cuticular coat.

a, the cardia, or recipient orifice, with the œsophagus cut off; *b b*, the circular plan of fibres, which at this part are very much increased, to give great force to the cardia, and prevent the possibility of vomiting. This plan is seen lessening in force as it approaches the large extremity of the stomach; therefore, it must have a peculiar office at this part; which, as it cannot be to prevent any thing entering, so it must be to prevent any thing escaping; *c c*, the longitudinal plan; *d*, the inner part of the great extremity of the stomach, covered internally with the cuticle; hence this is called its insensible part: its rugæ, or folds, which are small, are shewn on this surface; *e*, the membranous portion of the stomach, which is its vascular and sensible part: its folds are seen larger than those of the other portion; *f*, the external part of the great extremity; *g*, the pylorus, or pyloric extremity of the stomach, with a species of duplication of its membrane, forming a kind of valve to prevent the too hasty passage of food through it; *h*, the duodenum, or first small gut continued from the stomach, with the biliary and pancreatic ducts entering it; *i*, the mesentery; *k*, the small intestines ending in the cœcum; *l*, the cœcum, with its blind end shewn; *m*, the commencement of the colon by a contracted portion; *n n*, the continuation of the colon, with its membranous bands, and its sides thrown into cells; *o*, the termination of the colon into the rectum.

The Intestines.

The remainder of the alimentary canal is continued from the expellent orifice of the stomach, to the anus, or end of the passage; forming a long canal, which being of different dimensions, has occasioned it to be divided into the large and small *intestines*. In man, and in some quadrupeds, they hardly merit this distinction, there being but little difference in point of size; but in the horse, the disproportion is very considerable, the small intestines being not much larger than the human, but the large of an immense bulk. The length of the track also greatly exceeds the proportionate length of the human canal, it ranging between twenty-four and thirty yards in the horse, and between eleven and twelve in man. Of these proportions, the small intestines take up from twenty to twenty-two, and the large from seven to eight yards. Our knowledge of the habits of an animal may be in a great measure gained from an inspection of his intestines only: for, as a general principle, it is found that the length and capacity of the alimentary canal are in proportion to the difficulty of assimilating alimentary principles from the various matters used as edibles. The track is, therefore, larger and longer in the herbivorous tribes, less in the omnivorous, and least of all in the carnivorous. It is not easy to give a determinate place to the intestines, either individually or generally; the large, however, may be said to occupy all the inferior portion of the abdomen throughout; and the small to range between and upon them, both occasionally shifting their position by the peristaltic motion. They are, however, prevented from an unnatural displacement, by membranous productions of the peritoneum, under the name of mesentery, mesocolon, and mesorectum. The first investure or coat also of the intestines is derived from the peritoneum, which separates to receive the tube between its lamen. By this means it not only protects the intestines by its coverings, but it serves as a medium for the transmission of its vessels, and as a secreting surface for a lubricating medium. Their next coat is muscular, and is formed of two plans of fibres, a longitudinal and a circular; by the contraction of which, the vermicular motion, called *peristaltic*, is performed, the longitudinal slightly shortening them, and the circular diminishing their diameter. Within this muscular tunic there is a quantity of dense cellular tissue, which was formerly considered as the nervous coat, but which is known now to be only a layer of cellular membrane. The inner tunic of the intestinal track is the villous, or mucous, and is very vascular and sensible, presenting by its villous prominences an increased surface for the mucous secretion, as well as more numerous chyliferous orifices with which it is thickly studded. It is, however, furnished with no actual valvulæ conniventes, as in the human; they being in the horse rendered unnecessary by the great length of these organs, and the consequent slow passage of the aliments through them, as well by their position as their extent. The *division* of the intestines into large and small in the horse is self-evident; and each of these gains other separations, but which are not so well marked. The *small* are divided into duodenum, jejunum, and ilium; the *large* into cœcum, colon, and rectum. (*Vide Pl.* V.)

The *duodenum* is the first portion of the intestines, receiving the pyloric orifice of the stomach; its course in the horse is somewhat different from the track of the human pylorus; by which it gains rather a more complete covering from the peritoneum. It hangs loose and pendulous, being attached to the concave surface of the liver, from which making a turn, it becomes fixed to the vertebræ, and then takes the name of jejunum; but as in this course its length is nearer twenty inches than twelve, it is evident that duodenum is an improper term for it, in the horse. It appears rather larger in circumference than the other small intestines, and more vascular, but it is peculiarly remarkable for having the pancreatic and biliary ducts obliquely penetrating it, which they sometimes do by one common orifice, and as often by distinct ones, about five inches from its commencement. (*Vide h, Plate* V.)

The *jejunum* gains its name from being commonly found empty, and is attached to the mesentery, which follows its circumvolutions; the line of division between it and the ilium is only imaginary: it is usual to consider rather more than a third of the joint length to belong to this intestine, and something less than two-thirds to the next.

The *ilium* occupies the portion we have described within the iliac region, from whence it derives its name; its presents no peculiarities of structure; but, equally with the former, its circumvolutions are all connected by the windings of the folds of the mesentery. The extremity which penetrates the cœcum by a protrusion of its inner surface forms an incomplete valve, which in some measure prevents the return of the fæces into the smaller intestines.

The *large intestines* of the horse bear but little resemblance to those of the human, and may, on account of their vast proportions, be strictly called large. Altogether they differ widely from the small intestines in structure and appearance, being contracted in their surface into distinct compartments, destined to lodge the alimentary contents and to prevent its too hasty egress. The first of these is the *cœcum* or blind gut, and which might with propriety be considered an appendage to the colon, from whence it has been termed caput cœcum coli, or blind end of the colon. Into this the ilium terminates by protruding itself some way within the cavity, so as to form an impediment to the return of its contents. From this the anterior part of the cœcum projects forward two or three feet, in a pocket-like form, of the size of the colon (*vide l, Plate* V): the posterior portion beyond the insertion of the cœcum, forms a smaller blind end (see *Plate*); therefore the ilium may be regarded as entering the cœcum only. This gut usually occupies the right side of the abdomen, and appears immediately on opening the peritoneum; commencing from the colon and ilium in the right iliac region, it extends forwards to the right side, with its pocket-like part applied towards the diaphragm and liver near the xiphoid cartilage. In the human, and some quadrupeds, to the cœcum is attached another tubular appendage, closed at its free extremity, called the appendix vermiformis, whose use is wholly unknown: this is entirely absent in the horse. Through the peritoneal covering, we observe three or four muscular longitudinal bands, extending from its extremity along the muscular tunic, so as to divide the gut into three portions. One or two of these are usually covered with fat, and are not so regularly longitudinal as the others (see *Plate*). The internal membrane is plaited up, as it were, between these fræna, and by these intersections are formed numerous elliptical cavities called the cells. From this gut being frequently found with a considerable quantity of water in it, it has been conjectured to be a receptacle for fluid, and fluid only; but it is not always furnished with water, and I have also found the solid ingesta as well as the fluid within it.

The *colon* is small at its origin, as may be seen by a reference to *Plate* V, *vide m;* but it soon enlarges into an immense volume. Originating as it does from the base of the cœcum, rather beyond the entrance of the ilium, it can hardly be said, as in some other subjects, jointly to enter both cœcum and colon. It is therefore stretching analogy too far to consider as the valve of the colon the contracted space which immediately presents itself, although it may offer some resistance to the intestinal contents. Enlarging into a very capacious and long canal, it makes nearly the circumference of the abdomen, and again forms a second but slighter contraction: after which it once more enlarges, and again passes around the abdomen; when lessening a third time, it ends in the rectum. Upon these circumvolutions (*vide n. n, Plate* V) as well as upon the cœcum, the small intestines lie. It is, like the colon, furnished with three ligamentous bands in its large portion, but which are reduced to two only in the smaller parts; these form longitudinal fræna, which being intersected again by internal plaits, produce similar cells in this gut to what are seen in the cœcum. It is connected and sustained in its situation by that portion of the mesentery termed mesocolon. The colon and cœcum are the principal sufferers in those inflammations that arise from violent purging medicines.

The *rectum* is the continuation of the colon (*vide o, Plate* V), and passes backwards from the lumbar vertebræ to the anus. Its substance is thicker than that of the other intestines; and though it is not longitudinally intersected by muscular bands, still it presents a plicated appearance, and is puckered into small cell-like depressions; were it not for which interruption, the intestines might be too frequently stimulated to expel their contents. The rectum is attached to the spine and sacrum by a detachment of the peritoneum, which is here, therefore, called mesorectum: but the true lamen of peritonum does not invest its whole portion, but leaves it as it approaches the gut, which is at this part only covered with the cellular portion of it. The ligamentary bands of this intestine are very strong, and end at the anus in an expansion attached to the coccygis. The *anus* is the termination of the intestinal canal, and is opened by the force of the peristaltic motion and the consent of parts, and is shut by a muscular band around the extremity of the gut, called the sphincter. It is likewise elevated and retracted by two pair of muscles.

The *mesentery* (vide *Plate* V).—This great folded membrane is a prolongation of the peritoneum, which the intestines are, as it were, pressed into and surrounded by. Being thus invested, the lamen unite at the superior part, and form a single membrane, called the *mesentery*, and which is of different lengths, as the intestines are protruded farther or less within the great bag. These peritoneal prolongations are very useful, for they not only invest the intestines, and give them their outer covering, but they attach them likewise within their situations;

and they are, further, the medium through which they receive their blood vessels and nerves: and, moreover, they are the vehicle for the conveyance of the chyle by means of the lacteals, which are situated and sustained within these membranous folds. The origin of the mesentery from the spine is of small extent, but it is so framed, that as it proceeds it is enabled to follow the whole of the intestines through their course, branching out like a fan, from its beginning at the duodenum to its termination at the rectum. All that portion of it which sustains the small intestines, is called the *mesentery;* that which is attached to the colon, and whose extent is longer, has the name of *mesocolon;* and *mesorectum* is the term given to that more inconsiderable portion which attaches the rectum. Within its laminæ is contained in some instances a considerable quantity of adeps, which is greater or less, according as the animal is more or less fat in general. The *anterior mesenteric artery* arises from the aorta near the emulgents, in a considerable trunk, and soon divides into a number of branches, which pass between these laminæ of the mesentery, forming communications with each other, and then are distributed in a beautiful network around the small intestines principally. The *posterior mesenteric artery* arises behind, in a very considerable trunk, and is principally distributed to the great intestines, which however receive some large branches from the anterior. There is likewise a small branch by which the duodenum is supplied before it becomes attached by the mesentery, which is called duodenalis. The *nerves of the intestines* are principally from the anterior mesenteric plexus which furnishes the small bowels; and the posterior mesenteric plexus gives branches to the large; with some filaments furnished to the duodenum from the stomachic plexus, and to the rectum from a plexus within the pelvis. *Mesenteric glands:*—These are the conglobate bodies we have described in treating of the lymphatic system; situated between the lamen of the mesentery, and with whose structure we are not much acquainted, but whose use we know is connected with the lacteals; for we always find those vessels run through them; and when they are schirrous, the same vessels become obstructed. These glands now and then, though but seldom, become affected in the horse. I have found them frequently so in virulent glanders. In monkies, diseased mesenteries are a very common cause of death; and infants of the human species are very obnoxious to the same complaint.

The *lacteals* are the vessels we have already treated of in the lymphatic system, differing from the lymphatics only by the fluid they carry, and arising from the villi of the inner coat of the intestines throughout their whole extent, in the horse, as well from the large as the small intestines; and from whence they take up the chyle from their surfaces, and carry it in small trunks towards the conglobate mesenteric glands: these vessels, in this first space, are called *venæ lacteæ primi generis;* and from which glands they come out on the opposite side, in larger and fewer trunks, when they are called *venæ lacteæ secundi generis,* proceeding to penetrate other glands in the same way, till they at last reach the receptaculum chyli, and deposit their chyle, as has been described. (See *Lymphatics.*)

The *diseases* of the intestines are very serious, as might be expected from their great vascularity. The acute peritoneal inflammation called *enteritis,* is a rapid and fatal affection to them. They are also subject to inflammation of their inner or villous surface, either idiopathic, or from the irritation of drastic purgatives, or mineral poisons. Their muscular structure is also very frequently affected by spasm or colic; and occasionally they suffer from calcular concretions, which accumulate to an extraordinary size: diarrhœa and dysentery are also to be added to the list.

Uses of the Intestines.

The long tract of canal we have described, appears to be intended to receive the pulpy mass of the chyme, after it has undergone some alteration, and some solution of its nutritious part. As the chyme enters the duodenum, it becomes mixed with two fluids, the pancreatic and the biliary, by which fresh changes probably take place in it*; and here the chyle appears to be rendered more perfectly animalized, but it is yet doubtful whether some further change be not effected in it by the remaining intestinal track. Becoming thus mixed, it is propelled forward by the creeping muscular contractions of the intestinal track, called their *peristaltic motion,* and which appears to be operated by their two orders of muscular fibres; the longitudinal straightening the convolutions, and steadying them; while the circular order, in its progressive contractions, presses the contents onwards, not by continued but by gentle efforts, renewed after the lapse of a short time. This motion is not altogether

* What these changes are, have long been a subject of dispute among physiologists. The pancreatic secretion, in chemical characters, is not unlike saliva. It has, however, had a solvent power ascribed to it similar to the gastric fluid; but that it is not absolutely essential to life we know from the circumstance of dogs having survived the loss of communication between it and the duodenum. The biliary secretion seems to be more essential to the process of digestion, although even when that has been obstructed by biliary calculi, chylification has proceeded. This opinion is, however, at variance with the experiments of Mr. Brodie, who on applying a ligature so as to obstruct the ductus cholidochus of cats, found that, although the production of chyme in the stomach proceeded as usual, yet the conversion of chyme into chyle was invariably and completely interrupted. The bile, as an assistant to chylification, has been supposed to separate itself into two parts, a serous and a resinous one; and that the former was essential to the production of chyle, while the latter united with the fæces, and is ejected by them as excrementitious.

uniform in direction, as well as time; for we may observe the intestinal track sometimes reverse its movements, and sometimes it is agitated in a varied course. That this propelling force may not hurry the intestinal contents too fast, ample care appears to have been taken, and a structural arrangement is evidently made to delay the chyme within the intestines, till the whole of its nutritive parts are taken up. Hence, in animals who feed upon vegetable matter, nature has given an immensely long alimentary track; because, as in this kind of food there exists but a small quantity of nutritious principle in a large bulk, so it becomes necessary that much should be taken in, and also that it should be retained for a long time to be fully acted upon. Thus in the ox, though his colon is not so capacious as that of the horse, yet his cœcum is much larger; therefore, the detention is equally brought about, and this demonstrates the principal use of this gut, about which anatomists have differed so much*: add to which, that the intestines generally, in the ox, are much more capacious than in the horse; for, common herbage containing less nutritious moleculæ than grain, it was requisite he should have organs fitted for a more minute comminution of it, and which is effected by the agency of four stomachs. In him, therefore, the fæces are expelled in a more perfect state of solution than in the horse, and from which arises the known inferiority of ox and cow dung for agricultural purposes. In the horse, as grain affords more nutriment than grass, yet much fewer elementary particles (or perhaps possess it may be said the aptitude to be acted upon in a less degree) than flesh; so he is furnished with a longer and larger alimentary track than carnivorous animals, that the quantity taken in might be considerable, but more particularly, that the chyme might be long retained within it. Thus, therefore, the chymous mass mixed with the pancreatic juice and the bile, and having undergone a perfect conversion into chyle in its passage, is gently propelled along the intestines, whose villous surface or open mouths of the lacteals, are ready to separate the chyle from the fæcal part, and by an absorbing process to proceed with it through the mesentery and into the chylous receptacle, to be passed, through the means of the thoracic duct, into either the jugular or axillary vein; whereby it becomes mixed with, and converted into blood, producing that increase to the *quantity* we have mentioned; as the alteration from the air received by the lungs is that melioration of its *quality*, which we, at the same time, shewed was necessary.

When therefore we consider the length of the intestinal track, its peculiar structure, together with the horizontal position of

* Does not this volume in the cœcal capacity in the ox militate against the opinion of Mr. Percivall, that the cœcum is merely a recipient for water? The ox does not drink so much as the horse, and has also a specific receptacle for water in his second stomach.

the animal, we are at no loss to account for the difficulty with which we produce purging in the horse. It is not only difficult to produce it in point of time, but even in effect also; and hence it is a process of great exertion to the animal, and as such, occasions great exhaustion; and as these parts are very vascular and irritable, so improper doses of physic very frequently prove fatal. Nor is the irritability of the intestines the same at all times, which is the reason that the same medicine that will purge at one time, at another proves inert. It appears likewise, that the irritability of the horse's intestines differs from that of the human; at least, substances that stimulate the one have no effect on the other: thus a pound of jalap will not purge a horse, though twenty grains are a brisk cathartic to a man or a dog. Purging, it may also be learned, is nothing more than an increase of that natural action of the intestines, by which they expel their contents, called the peristaltic motion; and which appears brought on, and kept up, by the irritability of the organs; this irritability is such, as to remain in them for some time after they are taken out of the body.

The intestines have various stimuli; air proves a strong one to them, as we know by its effects: the food is a stimulus to them, but not a sufficient one probably; hence Nature has given another, which she pours out when wanted, which is the bile: when this natural purge is wanting, obstinate costiveness ensues; and, also, when it becomes increased in quantity, or vitiated in quality, diarrhœa takes place. The internal surface of these organs may be stimulated, as we have mentioned, to an inordinate degree of contraction by purges, in which case they expel their contents without absorbing the more liquid parts: thus, horses who easily purge, seldom fatten; and hence we see the propriety of permitting the intestines to empty themselves by mashes before we give physic; for, otherwise, the smaller ones may be stimulated to contract too speedily for those behind to remove the mass, and hence distention and inflammation may arise; and this the more easily in the horse, from his prone situation. Pressure is also an intestinal stimulus, as we find by the action of the abdominal and other muscles, in exercise, which causes a speedy evacuation of their contents; and, for the same reason, horses with small carcases are easily purged on exercise. We learn also from these considerations, that it is proper to let digestion proceed some length when baiting on a journey before we move the horse, or his chyme will be propelled before the chyle can be taken up; and thus he will reap only the benefit of a cordial, which, as it acts by sympathy, is merely temporary; but the permanent benefit resulting from an increase of blood, will be wanting; and hence it is, that horses flag under injudicious management, who, under a different treatment, would continue strong and equal to what is required of them.

The Liver.

The *liver* is so large and ponderous a mass, that there seems great wisdom in placing it in the centre of the body. Anatomically it is situated in the left hypochondrium, and a smaller portion in the right* (vide *b b*, *Plate* IV) part of it also extends into the epigastrium. Its convex surface is adapted to the convexity of the diaphragm, and its concave is applied to other abdominal viscera. It is of a dark red colour, and two feet, or two feet and a half in circumference, being thick towards the middle, but thin at the edges. In the horse it is divided into several portions, seldom less than seven or eight, forming two large lobes, and several smaller ones; and which divisions are usually observed in all animals destined for quick motion. Its principal or right lobe is situated wholly within the right hypochondriac region; the left presents an oval figure. These lobes are still further divided by marginal indentations or notches, some of which are deeper than others, and are called its *scissures*. It also presents several considerable depressions on the concave side; one of which is formed by the right kidney, the anterior part of which is received into a depression of a small division or lobule of the great right lobe: another considerable indentation, called its *great scissure*, divides the two large lobes from each other; and a third appears near the termination of this greater one, in the middle of the concave surface, and is called the porta of the liver, into which the sinus of the vena portæ enters. The remains of the umbilical vein likewise forms a considerable cavity within the great *scissure;* the vena cava and œsophagus also form depressions in their passage at its superior part. The liver is attached at its convex surface to the diaphragm by productions of the peritoneum (see *Plate* IV), and likewise by means of cellular membrane; the vena cava serves also to attach it: by all of which it is sufficiently retained in its situation, and its support is farther assisted by the pressure of the viscera. It is exteriorly covered by the peritoneum, and internally within this there is a considerable layer of cellular tissue that penetrates its substance, and which is furnished with numerous lymphatic vessels accompanying its several portions. The substance of this organ is composed of an immense number of granulated corpuscles, apparently formed from the several vessels entering it, and which granules appear glandular, and are in some way connected with the secretion of the bile. The vascular rami entering the portæ of the liver, have a cellular investment discovered by Glisson, and hence are called Glisson's capsule: it enters with the trunks, and serves as a connecting substance to the internal structure. The blood vessels are the venæ portæ, vena hepatica, and the arteria hepatica.

* By an error of the press, left and right were transposed in the last edition.

Vena portæ hepaticæ.—The circulation of the venous blood in the liver of the horse presents a remarkable speciality. We have before described the veins of the abdominal viscera, as returning their blood into the sinus of the vena portæ, which may be regarded as the termination of that portion, called *vena portæ ventralis,* and the beginning of that termed *vena portæ hepaticæ;* from whence it is branched off in every direction to be ramified throughout the substance of the liver: therefore, at this origin in the sinus, the vena portæ hepaticæ takes up the office of an artery. *Hepatic veins:* When the blood carried into the substance of this viscus, and dispersed throughout these corpuscles, has been acted upon, and the bile formed from it, it is collected from the ramifications of the *hepatic veins,* which are the true venal trunks of the liver: these unite into several rami, and pour their blood into the cava by very numerous branches. The *hepatic artery* is a branch arising from the aorta, which, though it furnishes so great a viscus, is yet much smaller than either of the emulgents: it is, therefore, evident, that it can take no part in the secretory office of this gland, but is simply intended for the support of the organ, and is wholly unconnected with its specific action.

Pori biliarii, and *hepatic duct.*—In the glandular corpuscles some great change goes on, by which a fluid substance is separated from the venal blood. These biliary pores appear to end in small tubes, which gradually form others, following the course and the divisions of the vena portæ, till they all unite to form one duct, remarkable for its whiteness, and called *ductus hepaticus.* It may be readily found on turning up the margin of the right hepatic lobe *(vid. c, Plate* IV), and originates from about the centre of the concave surface of the viscus, a little anteriorly. Before it entirely parts from the substance of the liver, it receives several minute biliary branches from the surrounding substance. It then accompanies the hepatic artery, and passing below the vena portarum, it terminates, as has been already described, in the duodenum, about five inches from the pylorus*, either by one orifice common to it and the pancreatic duct, or otherwise by a distinct one: but in every instance by a distinct internal orifice, by the which the peculiar secretion is observed to flow, and each presents its separate valvular apparatus to prevent the entrance of foreign matter.

From this description, it will appear that no gall bladder exists in the horse, which peculiarity he owns in common with all the tardigrade, and many of the saltigrade animals. Neither does any gall bladder exist in the rat and mouse: but it may be observed, their granivorous habits cannot be connected

* The entrance of the bile into the pylorus was formerly thought to determine the digestive powers of the animal, it being supposed that it opened nearest the pylorus in the most carnivorous; but this circumstance is now known to be no ways connected with the quality of the food.

with this structure, because it is also absent in the elephant, rhinoceros, camel, and dromedary; while in man, the ox, sheep, hog, and dog, a gall bladder is always found. In some of the former, however, a dilatation of the duct is observable, (and is often seen in the horse also) which may, in some measure, answer similar purposes. The nerves of the liver originate from a plexus formed of some filaments of the par vagum and the sympathetic; and as the nerves are but few in proportion to its bulk, so it is a viscus of little sensibility, and even under inflammation the pain experienced is rather dull than acute. The lymphatics are, however, sufficiently plentiful, and may be easily injected over its surface.

Hepatic disease is not a very common occurrence in the horse, which may arise both from the simplicity of its structure, and also from the absence of many of those predisposing causes which tend to injure it in the human subject; as spirituous liquors, &c.: but even under this latter view, it is not wholly exempt; for although we do not give our horses the stimulus of alcohol, yet we give them the stimulus of over-feeding, and that with food containing more nutriment than their exertions require, frequently. We also give them the stimuli of warm clothing, and heated stables; and from these we do really find that the liver is liable to become affected through the medium of the stomach; and it is no uncommon thing to observe in such horses the fæces hard, dry, and without their natural colour, which are accompanied also with costiveness and a yellow skin. Hepatitis, or acute inflammation of the liver, now and then attacks this organ, and consequent to this, and sometimes as a chronic affection, tubercles have been found in it: these are, however, much more rare in the horse than in the ruminants. The liver in many animals is found to be the peculiar seat of worms: out of eighteen rats that were examined, sixteen were found with tænia within its substance. The disease termed the rot in sheep appears to arise from a species of worm within the gall duct, and Monsieur Chalette has often found them in horses also.

The *physiology of the liver* is so intimately connected with digestion, that little remains to be noted here distinct from that process. It is evident that the bile of the horse having no reservoir for its retention, must be almost uniformly flowing*, except at the slight intervals when the peristaltic motion presses the sides of the duct. To the horse this regularity and constant distribution are perhaps essential, seeing his habits of taking in food are almost equally constant, and as such must be as frequently and uniformly digested and expelled; as we really find to be the case, from his numerous dejections in the

* The biliary secretion is, perhaps, less when at rest than during exertion, and thus horses closely confined are liable to have biliary affections and costiveness.

course of a day. To him, therefore, the aid of the bile is constantly wanting in the work of digestion, and its stimulating qualities as a purge to the intestines is equally so*.

The Pancreas.

The pancreas, known by the common name of sweetbread, is a glandular body of the conglomerate kind, presenting a very irregular figure, lengthened out into three processes, which extend it across the spine in the epigastrium between the stomach and left kidney (*vide f, Plate* IV). Its superior surface is applied to the abdomen, and is inferior to the great curvature of the stomach; it is also connected to the omentum, liver, duodenum, and spleen, and to the vena cava: its small appendicular portion, which is connected to the duodenum, is often called the little pancreas, and which sometimes furnishes a small separate duct. Its substance is formed of small glandular bodies, within which, the ducts collect into several lesser branches, and these into two others, from whence is formed the principal pancreatic duct, that penetrates the duodenum frequently with the biliary duct by one common external opening; but which if cut into a little way presents two distinct orifices, one proper to each duct: frequently the external entrances are distinct. The hepatic artery furnishes the pancreatic branch, assisted by the splenic; and the vena portarum receives the blood returned. Its nerves are derived from the cœliac plexus.

The *use of the pancreas* is not precisely known: it certainly secretes a fluid very similar in chemical properties to the saliva, and its structure greatly resembles the salivary glands, particularly the parotid. It has thence been supposed to serve to attenuate the chyme, and which view is strenghtened by our knowledge, that its secretion may be cut off without occasioning any disturbance to the digesting functions. The experiments of Sir A. Cooper would serve to shew that it co-operates with the bile in decomposing the chylous from the fæculent parts of the chyme or digested mass. Till its duct was discovered in 1642, by Vertsungi, it was said to act as a bolster for the stomach to rest upon. It is not very liable to disease in the horse, though now and then calculi have been found in it. This part in calves is similar both in structure, appear ance, and taste, to the thymus gland, and is used as such by the butchers.

The Spleen.

The *spleen,* or *milt,* is a viscus of a soft and apparently glandular structure, but without an excretory duct, of a rusty brown colour inclining to blue, but which varies according to age and

* As fashion alters opinions as well as dress, so it appears becoming fashionable to deny a purgative quality to the bile: Dr. Copland says, we have no more proof that it is a purge than an astringent.

circumstances: it is situated in the left hypochondrium, between the great extremity of the stomach and the left kidney (*vide p, Plate* IV). Its figure has been resembled to a scythe, but neither this, nor its size, are by any means always alike: it is frequently more of a pyramidal or triangular form. By its upper convex surface it is attached to the ribs, and to the left extremity of the stomach, and which gastric attachment is common to almost all animals. Inferiorly it rests on the abdominal viscera. The inner or concave part presents a kind of groove which divides it into two portions, an anterior and a posterior; within which groove are the openings admitting the splenic vessels. It is connected by cellular substance to the left kidney; by the vasa brevia to the stomach, and to the pancreas by other vessels, as well as by membranous productions to other parts, and is externally covered by the peritoneum. The blood vessels of the spleen form a very considerable feature in its anatomy, for in all animals they are found large. The splenic artery is not, as in the human, furnished from the cœliac, but originates at once from the aorta. The splenic veins are still larger than the artery, and arise from minute cells, into which the arterial branches had deposited their blood; by which arrangement not only can a vast quantity of blood be retained, but the circulation is also necessarily impeded. The splenic veins unite with those of the stomach, and contribute largely to the formation of the vena portarum. Its nerves are furnished from the cœliac plexus, and lymphatics are very plentifully distributed over its surface*.

Uses of the Spleen.

From the cellular texture of the spleen, its large blood-furnishing trunks, and the systematic detention of the blood within it, it is evident, it must have some particular office in the economy to perform; but what this is, has been a subject of much conjecture. From some accidents, and from experiments made, it appears not essential to life. It has been often removed in dogs without any apparent ill effects: but though its removal may not occasion fatal consequences, yet it does not follow, that it has not some great use in the system. It has been considered as an assistant in the formation of bile, by detaining the blood to render it easily acted upon. Dr. Haighton's experiments tend to shew that it is a grand auxiliary in digestion, by sending the blood it receives when the stomach is inactive, to that organ, when it becomes distended and in full secreting action. But the origin of the splenic artery not being the same in the horse as in the human, in some measure

* Lymphatics have been denied to the spleen, but in the horse I have injected them. Mr. Home observes that the spleen in most animals is more extensively furnished with them than almost any other organ.—*Compar. Anatomy*, vol. i, p. 235.

militates against this opinion; and which is rendered still more improbable, if the experiments of Sir E. Home be correct, which tend to shew that splenic blood is more serous and less disposed to coagulation than other blood. The *diseases* of the spleen are few and unfrequent: I have more than once seen it much inflamed in enteritis, but never idiopathically so. It has been found also enlarged by chronic affection*; and Mr. Henderson, V. S., has a preparation of ossification of it. It is very liable to become diseased in dogs, in which subjects it often attains an immense bulk, particularly in those affected with the canine asthma.

The Renal Capsules.

The *superrenal glands* are two bodies, situated at the anterior part of the kidneys, to which they are usually connected. Their size is by no means always the same; but in the horse, as in most animals, they are more considerable in the young than the old subject, in which they usually are not more than one-thirtieth of the size of the kidneys. Their figure is irregular, and may be judged of by a reference to *Plate* IV, *m m:* their colour is bluish, and their structure is granulated. They receive their vessels from the emulgents usually, and are retained in their situation by them, and by their attachment to the kidneys, as well as by the peritoneum, which covers their inferior but not their superior surface. Their use is wholly unknown†.

The Kidneys.

The kidneys are two glandular bodies (see *c c*, *Plate* IV), situated in the superior and posterior part of the abdomen; the right being generally the most anterior, and attached to the posterior margin of the right lobe of the liver, under the sixteenth or seventeenth rib; while the left is pressed backward by the spleen, and is therefore usually situated under the last false rib. The kidney bean, so named after these parts, serves to give a pretty exact idea of their shape, both in the horse and in the human: but they are by no means of a similar form in every animal, and sometimes even vary in animals of the same kind. The right is also usually rather more triangular than the left. In many brutes, as the hog, ox, and sheep, they are imbedded in a very large mass of fat; but in the horse, dog, and

* Mr. Percivall mentions a curious case of rupture of the spleen.—*Lectures*, vol. ii, p. 489.

† Although no direct communication can be discovered between these bodies and the kidneys, yet their mutual connexion is marked by the variations in structure which take place in different animals, and which are always consentaneous. Thus in the kidney of the elephant, in which the cortical and medullary substances are distinct, the substances of the renal capsules are so likewise; but in birds whose kidneys present an uniform structure, and want the distinctions of medulla and cortex, the renal capsules do the same.

most fleet animals, the quantity is not so considerable, but it is still surrounded by a quantity of cellular or adipose membrane; which being removed, the external coat appears, which is very smooth and compact. They are sustained in their situation by this cellular investure; by their vessels, and by the peritoneum, which passes over their inferior surface; but as it does not wholly cover them, and is not again reflected over them, they cannot be said to be within its sac. In the fœtal subject of the horse, and many other quadrupeds, as well as in the human infant, they are formed of distinct lobes; in some of these the lobes remain distinct through life: the ox and the bear at all ages have a lobulated kidney*. The internal structure of the kidney is not the same throughout, but appears, when cut into, composed of an external part, called the cortical; an internal portion, termed the tubular; and a cavity called the pelvis. The *cortical part*, which is of a reddish brown colour, and granulated structure, surrounds the tubular, and is very vascular, from the ramifications of the emulgent artery, which cryptæ or globose bodies secrete the urine from the emulgent blood. The *tubular portion* is whitish and striated, and appears composed of numerous minute tubes, which receive the urine from the granules of the cortical portion. These minute tubes carry the urine to others, which increase in size, and at length pour the contents by tubular openings into the cavity noticed. The *pelvis* is this cavity within the substance of the kidney, which in man is divided into three portions, but in the horse is uniform, and lined by a white strong membrane. From this cavity passes out the urinary duct, called *ureter*, which appears formed from a continuation of membranous matter from the pelvis mixed with muscular fibres. The *vessels by which the kidneys* are furnished with blood are termed *emulgent*. The arteries are very considerable in size, and are supposed to carry not less than a sixth of the whole blood of the body to these parts. Sometimes there is more than one to each; but usually there is one only, which emerges at a right angle with the aorta, behind the origin of the anterior mesenteric artery; by which means the motion of the blood is rendered slower, for the benefit of secretion. The left emulgent artery is very short compared to the right, from the situation of the aorta to that side; and it likewise arises usually a little more anteriorly than the other. Each emulgent artery proceeds to within a small distance of its respective kidney, when it divides into two or three branches (*vide Plate* IV), which penetrate the sinus of the kidney, and ramify throughout the cortical portion, probably, by three terminations; the venal, the supporting, and the secreting. The *emulgent veins* arise from the venal terminations of the artery before noticed, and

* The kidney of the sheep although a ruminant, has a very close resemblance to that of man.

unite into two or three trunks, which, passing out by the same sinus in each kidney, immediately unite and follow the direction of the arteries; the right being much shorter than the left, on account of the situation of the cava being towards the right side, and both terminate in that vessel, the left rather posterior to the other. *The right and left emulgent artery and vein* give each a branch to the capsulæ renales; and the left emulgent vein frequently receives the left spermatic vein. The *nerves* of the kidney arise from the splenic and hepatic plexi, which form a species of nervous network around each kidney, called the renal plexus, from which the kidneys are furnished. The lymphatics of the kidney are considerable, and accompany the emulgent veins, terminating at length in the receptaculum chyli.

The diseases of the kidneys are not numerous, but, from their great vascularity, they are subject to idiopathic inflammation, and still more frequently to that brought on by violent diuretics. They are also subject to calcular concretions, and to diabetes; and as their office is important, so under inflammation the effects produced are as serious and destructive as would occur in other parts of twenty times their magnitude. The most frequent ailment, however, to which they are exposed, is that of being bruised by the action of the lumbar muscles in violent exercise, which bruises produce a læsion of their fine vessels; and hence it is so common for horses who have been hard ridden, to make bloody urine afterwards.

The Physiology of the Urinary Secretion.

From the quantity of blood which the kidneys receive, we are led to suppose them very important organs, whose use we now know to be to separate from that fluid some parts whose stay would be deleterious to it. It is remarkable that many substances taken into the stomach, and absorbed by the lacteals, have their properties or sensible qualities rendered latent so long as they remain in the stomach, or in the lacteals, and even in the blood: but as soon as any separation takes place within the kidneys, these substances recover their qualities; hence cantharides received through this medium, or by the surface of the skin, produce no sensible effect on the blood vessels, but, as soon as they have been separated from it by these organs, they then produce the most sensible effects; inflaming the kidneys, ureters, and more particularly the neck of the bladder, and producing strangury. Nitre thus exerts its diuretic effect, and resin likewise; neither being active while existing within the blood vessels; but as soon as circulated through the kidneys, they produce a high degree of stimulus to those organs, whereby they separate much more of the watery parts of the blood than usual. If blood be examined in the emulgent artery and the emulgent vein, that in the vein will be found to contain the least serum; therefore, we have reason to suppose that the serum or watery parts of the blood are those taken up: but these are not the only parts separated, for there are other fæcal ones, whose stay would probably prove hurtful. Urine is therefore found to be a very compounded fluid *; and which is further proved by the decomposition that sometimes takes place within the kidneys and bladder, whereby calculi are formed in them: hence, therefore, we may reasonably suppose, that these organs form a grand emunctory for the separating and passing off some unnecessary and noxious parts of the blood, in a more substantial form; while the skin and the lungs do the same with regard to some parts that exist in a more rarefied form. The kidneys, like other glands, have their particular stimuli, many of which are unknown to us: some are sympathetic; others arise from substances taken in through the skin, or by means of the stomach, which, after having gone the round of circulation, enter the kidneys with the rest of the blood, and stimulate these organs; by which means they not only become more vascular, and, as such, can separate a greater quantity of urine from the increased quantity of blood; but, probably, the vessels themselves, by this stimulus, have a power of separating more watery parts from the same quantity of blood †.

In man, and in many animals, we have but little power over the kidneys; that is, they are less irritable than many other parts, and hence we find it difficult in some instances to increase their action or secretion: but in this subject, the kidneys are more easily acted upon, and no substances are more certain in their operation than those which are termed diuretics: neither is there any operation which occasions more disturbance in the system than active diuretics. When a horse has been debarred from water for two or three days, and then allowed to drink freely, the water alone will prove a most active diuretic: perhaps this may be connected in some measure with the natural tendency the blood has in him to possess

* According to Fourcroy and Vauquelin, the urine of the horse contains in 100 parts, carbonate of lime, 11 parts; ditto of soda, 9; benzoat of soda, 24; muriate of potash, 9; urea, 7; water and mucilage, 940. According to Mr. Brande, carbonate of lime, sulphat of soda, muriate of soda, benzoat of ditto, and phosphat of lime, were found in horse urine, in united quantities, to amount to one-eighth of the fluid. Mr. Brande could not find that the urine of the ass deposited any carbonate of lime, nor benzoic acid; but that it contained a much greater relative proportion of phosphat of lime and urea.

† It has long been a stumbling block to physiologists, to account for the quick passage of fluids taken into the stomach and conveyed to the bladder, whenever the quantity or quality interferes with the ordinary processes; and it is supposed that there must be some more direct road between the stomach and kidneys, than through the medium of the circulation, for the transmission of occasional fluids: for it is found that they arrive there when both the pylorus and thoracic duct have been tied up, and the spleen removed out of the body.

but little serum; for when the blood of a horse so fasted, and then allowed to drink largely, has been examined, still a larger quantity of serum has not been detected in it; from whence we may presume, that the kidneys are on the watch, as it were, to separate any superfluous part, and that very quickly. There is a great connexion between the kidneys and skin; for in summer, when much fæcal matter is evacuated by perspiration, but little urine is formed; but in winter, when there is but little perspiration, then much is secreted. That the urine is separated from the blood, is evident; for, in those animals who do not drink, as the rabbit, hare, &c., it is nevertheless formed, and they equally possess fully developed urinary organs: and if a horse be kept without drink, he still secretes this fluid, though in a diminished quantity. That it is intended, not only to carry off some of the watery parts of the blood, but likewise other matters, is evident from fowls, who have kidneys, but no urinary bladder: therefore in them the urine is deposited in the intestines, in a saline mass, which forms the white portion at the last expelled extremity of their fæces.

The *ureters*.—The urine having been separated from the blood, and passed into the pelvis of each kidney, is then carried off by means of a muscular tube called the *ureter*. (*Vide n n, Plate* IV). Each ureter passes out at the posterior part of its appropriate kidney, and is continued backwards, not altogether in a straight direction; being inclined towards the bladder, where the two gradually approaching each other, are crossed by the spermatic rope, and finally insert themselves at some distance from each other within the bladder, not far from its neck, piercing the coats obliquely, and running between them; by which mode of insertion the tunics of the bladder perform the office of a valve, permitting the entry of the urine, but preventing its return. The ureters are composed of three coats, or portions; an external, membranous; a middle, muscular; and a third, internal or mucous: their muscularity is, however, denied by some; but in the horse it is evident, from his position, that the urine cannot gravitate; and that therefore it must be propelled by some agency, which from analogy we judge to be muscular. The ureters are without the sac of the peritoneum, both at their origin and insertion.

The Pelvis.

That part of the abdomen, which is included within the ossa innominata and sacrum, is called the cavity of the pelvis. The posterior portion of this does not come within what is called the cavity of the abdomen, seeing the peritoneum does not reach to the bottom of the hollow, but only extends to its anterior part; so that all the viscera of the pelvis are not wholly within the peritoneal investment.

The Bladder.

This is a membranous and muscular sac of a pyriform shape, or in some measure like a double cone, situated partly within the peritoneal cavity, and wholly within the hollow of the pelvis when not distended. It rests on the pubis, and is surmounted by the rectum in the horse, and the uterus in the mare; but when distended, it extends beyond the pubis, and may even be felt in the belly. Those who are in the habits of visiting sick horses, should accustom themselves to the knowledge of an empty or distended bladder, from external examination only; as retention of urine is a very fatal, though fortunately an unfrequent disease. The bladder has a base, which is the middle portion, with an anterior and a posterior apex; and, contrary to the human, it is smaller in the female than in the male. It will contain, when distended, several pints; but the acrimony of the urine, or the stimulus of distention, or, perhaps, both these causes conjoined, seldom permit it to remain till the full quantity is collected. The peritoneum covers only its anterior portion; a prolongation of it extends over part of the inferior surface only: from the superior portion it passes on, and is reflected over the womb in the mare, and on the rectum in the horse; but which reflection does not reach to the posterior part, but leaves thus much of the rectum, and the upper surface of the bladder, uncovered by the peritoneum, so as to wholly exclude these portions of this viscus from the peritoneal cavity. It becomes important to the veterinarian to bear this in mind, as it would, if necessary to make an opening into the bladder, be desirable to do it without the peritoneal cavity; which therefore, it is evident, may be done by means of a puncture through the rectum: but we shall have occasion hereafter to mention a still better mode, though it is not improper to be aware of this also. The bladder is composed of three coats, or portions, one of which is dense and cellular: the next coat is muscular, the fibres of which are cómpacted together by cellular substance, and appear laid in every direction; but principally there appears an external plan, which is placed longitudinally, under which may be seen a transverse layer; intermixed likewise with others whose course is oblique, and of no determinate direction.

By the action of these various fibres, the bladder can contract itself so completely, as to throw out the last drops of urine, which could not so readily be effected, had there been only the longitudinal and transverse plans. In dissections of the human subject, and of animals who have died violent deaths, the bladder has been found in some instances so contracted as almost to form a solid mass; so great is the force with which these fibres can act. The natural contraction of the urinary sac is, however, a gentle perpetual motion without intervening relaxation, except when it is nearly empty, and then some violent contractions occur, with alternate relaxations, wholly to evacuate it. The muscular structure composing the bladder, like all other muscular parts, may be brought into a state of paralysis by over-distention: hence, if by any means the bladder be too long kept from evacuating its contents, it becomes so distended as to lose its power of contracting, and it finally ruptures. The inner coat of the bladder is the mucous, or villous, which appears very vascular, and secretes a thick mucus for the defence of the surface against the irritating effects of the urine; and when by any means, as by inflammation, this secretion proves defective, the bladder becomes in the most irritable state. This organ is connected in its situation by portions of the peritoneum, which are called its ligaments; and by the urachus, which is also a ligamentary rope that extends from it between the peritoneum and linea alba to the navel In the fœtus the urachus is pervious, and carries urine from the fœtal bladder. The remains of the umbilical arteries are contained within this ligamentary rope likewise, and pass with the urachus to the cyst, to be continued up to their origin in the iliac arteries. At its posterior part the bladder is pierced by three openings; two of which are situated near each other, and at a small distance from the superior part of the third, with its cervix or neck: the first are the openings of the ureters, by which the urine flows into the bladder. The other forms the outlet, and is furnished with a band of muscular fibres to keep it closed, called its sphincter. The neck ends in the urethra, which, in fact, is the continuation of this outlet, carried onwards through the penis. The arteries of the bladder arise from different branches of the internal iliacs; the venal trunks return their blood into the internal iliac veins; and the nerves are given from the sacral and abdominal plexi.

Uses of the Bladder.

It would have been inconvenient to animal life had the urine been constantly flowing, as must have been the case without a urinary reservoir; but this collects and contains it, till by its distention the muscular fibres are stimulated to contract upon it; the sphincter is then forced to give way, and the urine flows out. Calcareous concretions, in the form of either gravel or stone, are now and then, though but seldom, apt to form within this sac: it is likewise liable to inflammation, and to collections of inspissated mucus; and, at times, to a palsied state of the sphincter; all which will be treated of hereafter. The bladder in the horse is not much an organ of sympathy, yet, by custom, whistling excites it; but in some animals, as the dog, it is very much so: in them fear stimulates it strongly; and certain smells have a wonderful effect on it in the canine tribe, and which is equally dependent on habit as on lust, for it is observed in bitches, without the œstrum on them, and in cut dogs also. In the human, this viscus is an organ of surprising sympathy. The sound of music is an irresistible impulse to some persons to evacuate their urine: plunging the hands in cold water proves it imperatively so to many; and other circumstances, apparently equally remote from any connexion with it, excite its contractions in others.

THE MALE ORGANS OF GENERATION.

That the creatures which Providence has formed may not become extinct, they are endowed with a creative faculty of their own; and that they may be excited to call this power into action, they have certain impulses, whereby the generative act becomes necessary to their happiness. In man, whose passions are under the influence of reason, and whose intellectual pursuits check the natural appetites, carnal love is controlled; but in brutes, who have only the gratification of their appetites in view, lust is an irresistible impulse. The sluggish, and otherwise insensible ass, will swim wide rivers, leap hedges, and even go through fire, to prosecute his asinine amours; and such is the ardour of a frog, while under the act of copulation, although there is with him no immediate union of sexual organs, that he will suffer his head to be cut off, and yet not be deterred from attempting the completion of the act, which requires many days. The means whereby the great work of propagation is effected, is different in the higher and lower orders of animals; being much more simple in the latter, and consequently more complete. In quadrupeds it is brought about by the intervention and union of particular organs, in an act termed *copulation;* and the organs themselves are hence called *organs of generation*. These are distributed between the two sexes, so as to oblige each of them to take a part in this duty; and, from their mutual efforts, a new creature is formed, similar to its parents. The genital parts in the horse are most of them external: on the contrary, in the mare, they are mostly internal; and both in the one and the other, they have an intimate connexion with the organs concerned in the formation of urine, whereby one organization is made to answer a double purpose.

The *scrotum* is the envelopement of the testicles, formed from the integuments of the abdomen, elongated into a pocket, or bag-like form, and extended likewise to the large tubular covering of the yard, called the sheath. Outwardly it is smooth, and deprived of hairs; internally, it is lined by a cellular substance, which unites itself by one surface to the exterior cutaneous covering; and by the other to a muscular expansion called the *dartos*, which forms a distinct capsule for each testicle, and by means of a septum; leaving no communication between the two, whereby disease is prevented from communicating so readily from one testicle to the other.

The Testicles.

Within these sacs are situated the *testicles.* Nature appears to have given two, that, if one should become injured or diseased, another may yet remain; for the propagation of the species is Nature's grandest work, and the resources she gives to animals for this purpose are very great. The testes are two glandular bodies, which in most animals are first formed within the abdomen; and in some quadrupeds, and all birds, always remain there*. In the fœtal colt they are lodged within the belly, immediately behind the kidneys, and are retained there till some time after birth, when they begin gradually to appear within the scrotum. What influenced this peculiar passage of the testicles into the scrotum, was long a matter of dispute: in man it was supposed to be occasioned by their gravity; but this could not be the case in the prone brute; nor can it be effected by respiration, as we find them already in the scrotum of some animals before they have breathed; and in others, as the hedgehog, they remain within the belly, though respiration is always carried on. Mr. Hunter's interesting discoveries on this subject cleared up the difficulty; he found that the testes, when situated within the cavity of the abdomen, were enveloped by a prolongation of the peritoneum, in the same manner with the other viscera; and were each of them likewise attached to a ligamentous substance of a pyramidal shape, whose base, or broad part, adhered to the testicle, and its other portion continued through the abdominal ring formed by the separation of the fibres of the external oblique muscle; and that it became attached finally to the bottom of the scrotum: this ligament he termed *gubernaculum testis.* It attains its full growth before birth; after which period, it begins to contract and shorten itself; by which means, as it cannot draw the scrotum within the ring, nor free itself from the testicle; it therefore draws the testis itself from its situation under the psoas muscles, and which carries with it the covering of peritoneum it had around it, and in this manner the tunica albuginea of the testicle is formed. (*Vide i, Plate* IV.)

This progress is carried on gradually; and when the testicles by this contraction have been drawn to the abdominal ring, it is evident they must there meet with some obstruction; for the peritoneum surrounding the whole abdominal cavity, as we have described, only permits the passage of this ligament by a

* The elephant is an instance of the *testicondi;* the testicles in him remain within the abdominal cavity through life, so that he presents the singularity of having no scrotum. To an animal which has to make his way through woods and briars, a scrotal bag would have been inconvenient.

minute opening; consequently in yielding to the pressure, it must either open farther, or the peritoneum itself must be forced down: it appears that it does the latter; and that the testicles, before invested by the peritoneal covering they had in the abdomen, from their tunica albuginea, now force along with them this fold that was opposed to the ring, and which they carry with them, but which does not become united to them, but remains loose, and forms the tunica vaginalis to each (*vide h, Plate* IV); and is finally carried into the scrotum with the testicles by the complete contraction of the gubernaculum testis, which now being no longer wanted, becomes wholly absorbed. In the human, after the testes have passed the abdominal rings, a complete union takes place between the vaginal coat, or outer reflection of the peritoneum, and the surrounded rope; by which means all communication with the scrotum and abdomen is shut out. To man this is a wise and kind provision; for, from his erect position, were it otherwise, there would be a continual descent of some of the intestines; and, probably, a continual collection of the interstitial fluid of the abdomen: and in the few instances that do occur where this is left open, these effects ensue; that is, some of the contents of the abdomen make their way into the scrotum; which forms what Haller has called *hernia congenita.* But quadrupeds, from their horizontal position, not being subjected to this descent, have not this opening closed: therefore, in the horse, a communication between the scrotum and abdomen remains, this prone situation rendering quadrupeds in general but little subject to scrotal hernia*.

The *coats of the testicles* are usually described as three: the expansion of the cremaster, the tunica vaginalis, and the tunica albuginea. The *cremaster* arises from joint fibres of the obliquus abdominis, transversalis abdominis, and fascia lata muscles, forming a slight muscular expansion, which is continued with the spermatic cord till it reach the testicles, when it becomes merely aponeurotic, and inserts itself into the tunica vaginalis (*vide h, Plate* IV). This, therefore, cannot properly be considered as a true tunic of the testicle. The *tunica albuginea* is properly the first testicular coat, and immediately invests the body of each, being the portion of the peritoneum that surrounded the testicle in its first situation within the abdomen. This coat is white, externally smooth, very firm, and is united very intimately by its internal surface to the substance of the testicle: on its outer surface are seen vessels alternately in a direct and wavy course. (*See the right Testicle, Plate* IV.) The *tunica vaginalis* is the second portion of peritoneum we have described as descending by the pressure of the testicles,

* Dogs are sometimes found with epiplocele, or the obtrusion of omentum within the scrotum: but it never occurs until a diseased collection of fat has made an unnatural pressure on the abdominal contents.

but which only loosely surrounds them, forming a firm sheath. In Plate IV, this is seen opened from the right testicle. Having these coverings and appendages, each testis may be considered as a glandular body approaching to the figure of a kidney, having the great curvature and great extremity directed before, and the lesser curvature and smaller extremity directed backwards and towards the abdomen: to the posterior portion is attached the appendix, or epididymis. The internal structure of the testicles is formed of an infinite number of very minute tubes, which appear the secreting ramifications of the spermatic artery, so minutely divided, that Dr. Monro has calculated that their length, when united in a human testicle, would not be less than 30,000 feet. After this numerous and minute division, these tubes unite to form several ductiform bodies, which inosculate together, and terminate in the vasa efferentia. The *epididymis* is formed from the united mass of these vasa efferentia, and is situated at the posterior external surface of the testicle, having a bulbous head, within which these tubes take a very convoluted direction, as may be evidently seen on the outside (*vide k, Plate* IV, *right Testicle*): proceeding upwards, they finally form one canal, termed the vas deferens.

The *spermatic arteries* furnish these bodies with blood, one to each testis, which arises from the inferior part of the aorta (*vide Plate* IV), a little behind the emulgent; but soon uniting with the spermatic vein of that side, both spermatic arteries proceed backwards enveloped with cellular membrane, and pass obliquely over the psoas muscles, diverging gradually from each other as they cross the ureters, when they are continued downwards and outwards to gain the abdominal ring. In their passage, they usually give off a branch to the cellular membrane of the kidneys, peritoneum, and other parts, without being apparently diminished in size; and when arrived at the abdominal ring, they are continued with the vas deferens, invested in the same sheath, to be ramified throughout the body of the testicle in the manner described. The spermatic veins receive within the testicles the blood that is not taken up by the secretory power of the organs; when passing out of the testicles, they form several trunks, whose convolutions are numerous, and their communications very free with each other, so as to make a varied plexus of venal branches, which passes upwards, and terminates, the left usually in the left emulgent, and the right in the vena cava. (See *Plate* IV). The *nerves* of the testicles are received from an abdominal plexus; and their *lymphatics* may be seen spread over the surface of each. Each *spermatic cord* is, therefore, composed of the spermatic vessels, the nerves, the vas deferens, with the lymphatics, and the cremaster muscle, united into one rope, by cellular substance; which thus passes from the scrotum through the abdominal ring, not, as in the human, in an oblique direction, but in a right line.

The *vasa deferentia* are the united trunks of the secretory vessels of the testicle, continued one from the upper extremity of each epididymis. The internal cavity of each vas deferens is small, but its substance is strong and white, running up with the spermatic artery and vein, and entering the ring within the general sheath of the rope, when it separates from the blood vessels, and proceeds upwards and backwards to the superior and anterior part of the urachus, crossing the ureter in a particular manner (see *Plate* IV): each is then continued over the lateral and superior part of the bladder, to gain the posterior portion; when it enlarges into a long oval cavity, which is cellular in its structure. This cavity is about the same size with the vesiculæ seminales, and each lies immediately before, and alongside the seminal vesicle, and terminates alongside of, though distinct from, it; one on each side of the urethra; in such a manner, that though these two canals are contiguous, and their openings continuous, yet it is impossible that the semen should enter the vesiculæ seminales. Their orifices are within the urethra, at that portion which is surrounded by the prostate; the vesicula, and the vas deferens of the right side, opening into the right side of the urethra, and those of the other on the left. (*See these parts in Plate* IV).

The *vesiculæ seminales*, as they are improperly termed, are two oblong membranous bladders, situated one on each side of the neck of the urinary bladder, behind the dilatation of the vasa deferentia. They are not, as in the human, of an externally knotted appearance, and internally formed into a number of convoluted cells; but are externally equal, and internally each forms a single cavity covered by the general cellular substance, and by it connected to the bladder. In form, appearance, and size, they are very similar to the enlargements of the vasa deferentia, and are shut at one extremity by a round end; and, at the other, are each diminished into a small canal, which lies contiguous to the canal of the vas deferens, and ends by a large excretory canal which opens into the urethra by one common orifice, with that sometimes, and at others by a distinct one; the form and appearance of which may be seen, by referring to *Plate* IV. They contain a fluid very similar to that of the vesiculæ seminales, and which is undoubtedly intended to mix with it: but they cannot be the receivers of the semen; for the openings, although continuous, are kept distinct, and water, passed by the vasa deferentia, never enters the vesicles. In the human, the mechanism is in some measure different, and water, passed in thus, will in some instances enter them. Mr. Hunter was first induced, from his observance of brutes, to conclude, that, even in the human, these bodies secreted a fluid, *sui generis*, intended to mix with and dilute the semen: and he proved that they could not be seminal receptacles; for they continue to appear as full in the castrated as in the entire horse. There is, also, a small canal, at the superior part of the neck of the bladder, which opens sometimes into one, and sometimes into the other of the canals of these seminal adjuncts. Bourgelat says, it bifurcates, and has a distinct opening on each side: but this I have not observed in the subjects I have examined. It appears only an appendage to the vesiculæ, and probably answers the same purposes. Cloven-footed animals altogether want the vesiculæ seminales.

The *prostate glands.*—These are glandular bodies, whose appearance is by no means similar to the human prostate; for instead of one, there are in the horse evidently two irregular bodies, placed one on each side of the membranous part of the urethra, near to the neck of the bladder, surrounding the posterior part of the vasa deferentia, and vesiculæ seminales, and being situated superior to them, over the urethra, so that they lie immediately under the rectum, where they may be readily felt, by introducing the hand within that gut. Their internal substance is spongy and cellular, and each has several little ducts which open on one side of a rising line in the urethra, termed verumontanum; by which ducts a thick cream-like fluid passes into the urethra. *Cowper's glands,* or the lesser prostates, form two smaller glandular bodies, which, in the human, are frequently wanting; but in the horse are always distinct, and of the shape and size of a chesnut, situated just beyond the prostates, one to each side. (*Vide g g, Plate* IV.) Some comparative anatomists deny the horse having any Cowper's glands, but give him four prostates. The adherence to the human nomenclature facilitates comparison, it is therefore eligible to retain the present appellation. The structure of these differs from that of the large prostates, inasmuch as their cavity is more regular and definite, and their substance less spongy: they are covered by the transversalis perenei muscles, so as to give them a regular muscular strata, that probably impels their contained fluid, which is not unlike that of the prostates, and is poured out near them by similar openings, rather below and beyond.

The Penis, or Yard.

The penis, or yard (*vide Plate* IV), is a long firm body, nearly two feet in length, with one part almost prismatic, but towards the anterior extremity cylindrical: in its natural situation, it is covered externally by the sheath, which is a continuation of the general integuments of the belly, continued from the scrotum, by which means it is not pendulous, but closely attached to the belly, as is observed in all the herbivorous mammalia. The *sheath* of the horse bears but little similarity to the integuments of the human penis: in him it is a true extension or overlapping of the integuments of the abdomen, but is rendered peculiarly appropriate by having two adductor muscles which spring from the aponeurotic and muscular parts of the abdominal muscles, and which, being inserted into its anterior part, serve to draw it forward and over the penis. Two other muscular plans retract and open the sheath. In the usual state, the penis is entirely hid within the sheath, from its extent of surface, it being continued from the scrotum to near the navel, where, although it appears to terminate, it is merely reflected: at this part it is much thicker, owing to a firm ligamentous substance within, which forms a kind of ring, and is useful in keeping the orifice open and firm: from this the reflected integuments become thinner and more vascular, and, running within, they extend backwards again, and are reflected so as to encircle the glans, but not exactly in the same manner as in the human. Such is the situation of the parts when the penis is retracted; but when erect, it appears a large long body distended out beyond its covering; and it will then be found that the ring, forming the termination of the external part of the sheath, now forms an enlargement around the distended penis, and that the integuments are stretched from it in a true continuation over the whole extent of that part which appears without its vulva, being firmly attached to the extremity, or head, but loosely only to the rest of the parts*: when the penis again contracts, it enters the sheath, and draws this portion with it, which is called the *prepuce;* within which is seen a moist secretion that keeps these parts from adhering. The body of the yard is composed of two cavernous flatted portions closely connected, and a spongy canal admitted within an inferior groove.

The *urethra* is this spongy membranous canal continued through the body of the penis from the neck of the bladder, of which it appears the continuation. Its first portion is simply membranous, and lies within the depressions formed by the two prostates; the next is made up of that which lies between the two glands of Cowper, and thus far it is within the pelvis; but as it passes around the pubis, extending from behind forward in the great angle formed by the posterior junction of these bones,

* In the plate, the prepuce is distinctly seen lying in folds, as it does when the yard is not distended; the ring around is the enlarged part of the sheath where it turns in, to form all the inner portion, which is distinguished by the name of prepuce: the portion beyond this is the ligamentary coat. Within this prepuce are found papillary risings, which Daubenton and Hunter consider as the rudiments of the mammæ, or teats, which, in the multiparous, are situated along the male belly. The prostates, the vesiculæ seminales, and what are denominated Cowper's glands, admit of so many combinations in the various mammalia, as to render it extremely difficult to class either their structure, uses, or even their correct nomenclature. Cuvier has discovered in some mammalia, of which the mole and hedge-hog are instances, certain accessory vessels, which he has therefore termed *vesiculæ accessoriæ.*

it loses its membranous structure, and becomes at once considerably enlarged, by gaining an acquisition of muscular fibre. It therefore is evident that the urethra must, in this course, make an acute angle; for while within the pelvis, and proceeding from the bladder, it is continued backwards, lying upon the uterus in the mare, and upon the pubis in the horse; but after proceeding in this direction, it passes at once around the posterior junction of the bones of the pubis out of the pelvis, and then proceeds on the outer side of this bone, directly forward. In the human subject, although the urethra makes an equally sharp turn around the inferior part of the pubis, yet as in him the penis is unconfined, so a sound, or catheter, can be introduced into the bladder: but, in the horse, the angle being rendered very acute by the attachment of the penis to the belly, we can only introduce any instrument as far as the perinæum; and if we wish to introduce it farther, we must make an external opening in that part on the introduced instrument, and repass the same instrument, or another, within the canal of the urethra, just as it describes this angle, it being here surrounded neither with spongy substance, nor with the prostates. This part, therefore, being thus circumstanced, forms the proper point at which to open it; and fortunately for such an operation, this described point is exactly the portion that presents itself in the perineum on passing a sound.

As the penis turns the angle of the pubis, it receives a species of ligamentary expansion from these bones; and after it has completed this turn, and gained the under side, it receives the cellular envelopements described, and which are continued around it through its whole length, to the extremity of the penis. This sponge-like portion of the urethra communicates with the cavernous substance, and is retained between two membranous portions; one of which is the inner mucous membrane of the urethra, and the other a true membranous covering to the spongy part. This internal mucous coat of the urethra is very vascular and sensible, and is pierced by the several openings of the vasa deferentia, the vesiculæ seminales, the prostates, and Cowper's glands; besides which it presents, through its whole length, the orifices of small mucous ducts, termed lacunæ. The canal at length terminates in a fossa in the middle of the head, or extremity of the glans penis, by a projection of its inner membrane, (*Vide g, Penis, Plate* IV.)

The *corpora cavernosa* are two cavernous bodies separately attached to the bones of the ischium and posterior part of the pubis: they however soon approach each other, and unite just before the symphysis; not in the manner of the human, like two tubes applied to each other, but like two flattened half tubes, and which unite so intimately as to appear but one body, which is not circular, but prismatic. They are externally covered by a very strong membrane; internally, they are cavernous, with strong transverse muscular fibres which intersect each other, and are mixed with a compact cellular substance (see *Plate* IV). These cells are always filled, more or less, with blood, but when the penis is erect they are fully distended: those of the cavernous communicate with the cells of the spongy portion. The cavernous bodies terminate some inches before the extremity of the penis in a rounded end, which is received into a corresponding depression in the glans; and throughout the whole extent are grooved underneath, receiving the greater portion of the urethra.

The *glans penis* of the horse appears a distinct part, and is not formed, as in the human, of an expansion of the spongy portion of the urethra; it is also unlike that of man, in being cylindrical, and in extending some inches up the yard. It is connected to the corpora cavernosa, and spongiosa, by a strong cellular connexion, and by a continuation of the ligamentary integuments of the yard, receiving the rounded end of the cavernous parts into an appropriate depression. It is larger than the body of the penis, is cylindrical, and covered with the general ligamentary expansion, and with the prepuce. Its internal substance is very spongy and cellular, so as to admit of equal expansion with the other parts of this body, and ends in a kind of ring around its verge, which is larger and more prominent above than below. This anterior surface of the glans presents a considerable depression, or fossa, with a central eminence, formed from the termination of the inner membrane of the urethra, which divides the fossa into an anterior and posterior division, within which there is usually a quantity of sebaceous matter. The whole surface of the prepuce is furnished with glandulæ odoriferæ, secreting a sebaceous matter, which sometimes becomes so acrimonious as to irritate and inflame the yard, and produce a discharge from the surface, or gonorrhœa. The *muscles of the penis* are three pairs; the erectors, the accelerators, and triangulars. The *erectors* arise from the tuberosity of the ischium, embrace the two roots of the cavernous body, and are inserted into its lateral parts; by their contraction they apply the penis to the belly, and consequently are of great use in copulation or *covering:* their power must also be very considerable to counteract the weight of the yard. The *accelerators* are two fleshy expansions extending over the bulb, and over nearly the whole length of the urethra, by whose means the urine and semen are ejected from the urethra, and the canal kept closed when it is not passing one or other of these fluids. The *triangulars* are similar expansions, but spread farther back, assisting the accelerators, and also influencing the prostate and Cowper's glands. (See *Myology*.) These described portions of the penis are immediately invested by a very dense, firm, but elastic ligamentary lamen, and which has been improperly termed its nervous coat. It covers the corpora cavernosa and spongiosa, and inserts itself into the symphysis pubis. Over this is expanded another membranous investment which forms the sheath and prepuce. The *arteries of the penis* are furnished from the pudendals; but the veins are larger beyond all comparison: the ramifications diffuse the blood through the cavernous cells, and from these it distends the spongy portion. This takes place in a greater degree; that is, the artery injects more blood than usual, when the influence of the mind extends to the yard, impelled by lust. The *veins of the penis* are likewise branches of the pudendals: in the human there are three or four only on the dorsum penis; but in the horse they are very large and numerous, and form a complete network over the back of it; and which are easily raised altogether in taking off the cellular tissue. By this formation the blood can, in usual cases, be readily circulated, for the artery is but small, and the veins infinitely numerous; but when the artery acts more than usual, then the blood cannot pass off, and distention must be the consequence. The *nerves* originate from the lumbar and sacral.

Uses of these Organs.

Evacuation of urine.—From what has been said it will appear, that the organs we have described are subservient to two important purposes; some of which are concerned in both; others of them only in one of these purposes, which are the evacuation of the urine, and the formation and ejection of the semen. The penis divides its use between these processes; and this forms an instance of one part performing two distinct functions. We have already traced the urine into the bladder, and we have described the means by which it is passed from thence; we have only, therefore, to remark, that when the bladder contracts, the sphincter is forced open, and the fibres surrounding the urethra dilate, or become passive; the urine then flows out, by the force of the contraction of the bladder, in a considerable stream; and, when finishing, the last drops are expelled by means of the accelerator muscles.

Generating use of these organs.—Within the testicles is generated, or secreted, a fluid, which, when it is formed by an adult and healthy horse, and placed in a proper receptacle, such as the healthy uterus, or womb of the mare, it bestows the power upon the female organs to frame, fashion, and bring to maturity, *a fœtus*, whose parts, habits, and manners, correspond with those of its parents. Animals being formed by nature solicitous for the propagation of their species, the appetites conducive to this end are very strong; and any obstruction offered them, when under the influence of lust, makes them ferocious: to quell this, and render them open only to the stimulus of preservation, horses are very generally in this country, and many parts of Europe, castrated. Nature has also wisely ordered that the perfection of the generative organs shall not become complete till the animal is evolved, and arrived at maturity: had it taken place sooner, not only the offspring would have suffered, but the parent likewise; for it is a secretion in which much general power is wasted; and hence, when it begins to form in large quantities, the body ceases to grow: therefore it is that, when we do castrate animals, we do it also early, to make them large; for then the portion of living power that would be expended on the seminal secretion, is employed in the other general secretions of the body; hence more blood, more bone, and more muscle are generated. It is not only the mere quantity secreted which occasions this waste of power; for there is more saliva formed in one day than the testicles secrete semen in a week or month; but this secretion has a greater connexion with the mind, and the exertion of the mental powers weakens more than those of the body; hence the male of all animals becomes weak in the season when the female has her *œstrum* on her, or is at *heat;* and even without copulation the horse will not thrive, provided he is suffered to be under the influence of lust, by being near to mares. That this secretion has some remarkable sympathy with the body in general, as well as with the mind, is evident from what takes place in cut horses, and what is observed in those uncut. When a horse is early castrated, he partakes of the mixed nature of the horse and mare; his crest is neither so round nor so large, nor is his voice so deep; his general form also becomes lightened, though his size is increased. In an entire horse, on the contrary, at the time when the semen first begins to form, his person alters, his tones deepen, his neck thickens, and his crest rises; the mane and tail lengthen, and his whole figure becomes round and graceful; at the same time he exhibits repletion and a strong smell.

In the *act of copulation,* therefore, it appears that the nervous influence acts upon the vascular system of the penis, whereby the arteries carry more blood, while the veins are rendered unable from some cause to effect its removal, by which means the cavernous cells become fixed, and the penis, by this distention, is erected; when, from the friction produced by the vagina, the penis becomes stimulated into a more exquisite sensation, with which, by a common consent of parts, the enlargements of the vasa deferentia and the vesiculæ seminales participate; when, by the assistance of the accelerator muscles, the semen and diluting fluids are pressed out, and by a convulsive effort, injected into the vagina: the stimulus of the semen being lost, the appetite becomes satisfied, the nervous influence is removed from the vessels, and the penis returns to its ordinary size.

THE FEMALE ORGANS OF GENERATION.

THOUGH the division of these organs into external and internal is sufficiently common, it is in this instance, at least, useless; the only parts that can be considered as external, are the bag, and mammæ or teats, with the vulva, or sheath.

The *bag* of the mare is formed of two distinct collections of glands, which, from their proximity, are considered as one. In the multiparous animals, as the dog, the hog, the rabbit, &c., these bags are numerous and distinct, because, from the number of young, it would be inconvenient were the teats not as numerous as the offspring: but in the uniparous, as the mare, cow, sheep, &c., as the progeny at one bringing forth is confined to one, or at most, in ordinary instances, to two; so this part is double, and situated between the hind legs. In the mare, each of the bags has a *nipple* or *teat*, and the bodies of the glands themselves are made up of an infinity of arterial ramifications; from which a fluid is secreted, called *milk*, which is destined to the support of the young colt, till the evolution of his organs has enabled him to pursue his own means of support. The *teat* or *nipple* (of which there are two) receives the secreted milk by several tubes, which have separate expellent orifices on its lower extremity, with valves placed superiorly over each opening, by which the fluid, in ordinary cases, is prevented from flowing out; but when the nipple is pressed up, the valve opens and permits the free entry of it; thus the colt is seen to push up the teat with its nose; pigs and puppies with their feet; and a similar action is common in milking of cows. The *milk* in different animals has different component parts, and different tastes; but in each, it has those best adapted to the animal it is intended to nourish.—See *Hygrology*.

The *vulva*, or *sheath*, is a long oval opening immediately below the anus, with a very small space between, called the perinæum. The vulva of the mare is not, as in the human female, a mere entrance to the vagina, but forms a distinct canal of some length, which leads to the true vagina. It is formed of two labia or lips, exactly applied to each other, whose junction above and below is called its commissures. The skin which covers the labia externally is usually black, and deprived of hair, presenting a line of division with indented edges; after which the same integuments form the inner surface, but become more vascular, and at last degenerate into, or become blended with the tunics of the vagina. The substance of the lips is, besides, made up of some cellular membrane, with a strata of muscular fibres, uniting at the superior commissure to the sphincter ani, and inferiorly to the clitoris; in copulation these embrace the yard, and at other times they support and close the labia. The internal surface of the vulva is kept moist by a mucous secretion from its vascular membrane.

The *clitoris.*—When the inferior commissure, which is thicker and rounder than the superior, is separated, it is found to lodge a body that appears like an imperforate glans penis, and which is intended to answer the same purpose in the female, being, by its cavernous structure, filled during copulation, by which its sensibility is increased. The clitoris, like the male penis, has two cavernous bodies attached to the ischium, whose internal structure is cellular, and their external strong and very elastic; they may be inflated also like the penis, either by air or injections: it corresponds with the glans, in having a species of prepuce formed from a fold of the inner sides of the labia, within which likewise are openings pouring out a matter similar to the glandulæ odoriferæ in the male; and it has likewise an expansion of muscular fibres, termed the erectors, performing the same office with those muscles in the male.—The *female urethra:* When the labia are separated, the internal cavity is called the *navicular* or *scaphoid fossa,* at the inferior part of which is placed the clitoris, as we have shewn; above this, and rather more internally, is situated the urethra, which in the mare is a short large canal without any curvature, and simply membranous, with an internal vascular surface furnished with lacunæ similar to the male. Its orifice may be distinguished from a doubling of substance like a fold around it; and when the urine is ejected, the clitoris is brought forwards, and elevated by means of the muscles, so that the urine may be completely expelled, and none remain to irritate the internal surface.

The *vagina* is a long membranous canal above and beyond the clitoris, capable of great extension, but in the natural state about eight or ten inches long, and two in diameter. Its direction is nearly horizontal, and situated between the bladder and rectum; by its external orifice uniting with the vulva, and by its internal terminating in the neck of the uterus. It is composed of a spongy cellular substance interwoven with numerous blood vessels; it has likewise a considerable muscular fabric, and internally is lined by a fine vascular secreting membrane, which is thrown into numerous folds, whereby its capacity for distention is much increased. The vagina, uterus, and bladder, are only in part covered with peritoneum, and the extent of this covering is easily seen in the dead subject; for it takes in as much of these parts as can be observed within the cavity of the abdomen. The female bladder, therefore, though it might be punctured like that of the male without penetrating the abdominal cavity, yet it must be through the vagina, and therefore is still less eligibly performed in the mare than in the horse. The superior part of the vagina is bordered by a membranous valvular fold, which Mr. Hunter appears to have mistaken, and has thence been led to assert, that women, mares, and elephants, were the only beings who had a hymen. But this structure, in mares, appears simply a membrane to guide the urine, and to prevent its entering and irritating the vagina; and is situated at the inner extremity of this canal, and therefore differs from the human female hymen, which is placed at the mouth of the vagina. It likewise is not destroyed in those mares who have had foals, and therefore is still less like this part in women.

The *uterus* of the mare is very dissimilar to the human womb, which is only an uniform bag, but in this animal it has a body and two branching portions, called its *horns*. This organ is implanted into the vagina by a narrow portion, called its neck, from which is continued the body, which is six or eight inches long, and about the size of a small intestine; with the fundus or bottom extending rather beyond the bladder, and bifurcating into two large cornua which also measure six or seven inches, and float within the cavity of the abdomen, one to the right and the other to the left, under the anterior part of the ilium, rather without the pelvis, resting directly upon the large intestines, and behind the convolutions of the small ones. In the multiparous animals, or those which have numerous young at a birth, these cornua are very considerable, and the fœtuses are lodged within them; but in the mare, which may be considered as uniparous, the secundines only are lodged within*. To prevent any prejudicial removal of these parts from their situation, the peritoneum, after it has covered part of the uterus, is reflected over the horns, and envelopes the Fallopian tubes. Though the mare has a womb similar to that of a multiparous animal, she seldom has but one foal; and when there are two, they seldom both survive.

Fallopian tubes.—The extremity of each cornua, or horn, has a small conical tube attached by its apex, while its broad extremity called the fimbria, like the large part of a trumpet with a fringed edge, floats in the cavity of the abdomen, being only slightly attached by one part to the ovaria. These tubes are very tortuous in their direction, and the extremity of each, which is attached to the cornua, is extremely small, hardly admitting a hair; but the other is more considerable, and is turned towards the ovaria. They have rather a firm membranous struc-

* In few internal organs is greater diversity of character observable than in the uterus, and it is remarkable that the most simple kind belongs to the human. From man the complexity increases in various degrees, but still not in a ratio with the importance of the animal, or his general complexity of structure. In the dog, hedge-hog, and the larger herbivora, the uterus bicornis is found; in a third kind we find a double uterus, where the cornua, instead of opening into a common cavity, enlarge into two distinct uteri: such is the case with hares and rabbits. In some of the opossum tribe the womb is also double, but with a great speciality in the oviducts. The uterus of the kangaroo forms a grade between the single and double, for in her it is found with a clear central line of division, but a common cavity.

ture, and at the largest part are the size of a large quill, and about two or two and a half inches long.

The *ovaria* are two oval oblong bodies of the size of an egg, situated at the extremity of the uterine horns, enveloped within a fold of the peritoneum, but floating in the abdominal cavity: they are composed of a compact spongy substance, containing a number of little transparent vesiculæ, called *ova*, whose number is uncertain: each ovum appears surrounded by cellular substance, and is described as having two coats, the outer of which is represented as belonging to the ovaria; for when the vesicle escapes, this remains and produces an indentation, and leaves a green spot, which remaining spot is called *corpus lutea*. The vessels and nerves of the uterus have been described in the sections on Angiology and Neurology.

Sect. XVI.

OF ŒSTRUM, CONCEPTION, PREGNANCY, AND EVOLUTION OF THE FŒTUS.

Nothing in the animal economy is a greater subject of admiration than that wonderful reproductive process, whereby a new being arises from the efforts of the old. In the lower orders of animals, conception and the production of their young appear most simple; but in the higher orders, the process becomes more intricate and obscure. Some of the former produce their young without sexual distinctions, each being fruitful, and capable of begetting its kind: in some, the offspring are produced within the body; in others, by a limb or part of the parent trunk. But in quadrupeds there is a true sexual distinction and division of generating organs; the work of propagation is mutual, and it becomes necessary for the male semen to render the female ova prolific, either by direct contact or by a sympathy we cannot explain. The animals called cold-blooded, some of them do it without the immediate contact of the sexual organs; but the greater number have a penis intrans, and inject the male semen into the female generating organs.

Of *œstrum*, or *heat*.—That the great work of propagation might not be left to chance, all animals are irresistibly impelled to it by the sensation of lust, called in quadrupeds *heat*. This sensation happily does not arise in any great degree till the organs, by their complete evolution, are fitted to the purposes they are destined to fulfil: otherwise we should have parents imperfectly developed, and progeny without stamina. In the human, Providence has kindly limited this sensation so as to be under the dominion of reason and modesty; and to this end in ourselves, though it is not violent, it is constant; that it might not, by returning only at stated periods, be of necessity strong and irresistible, and because the human fœtus can be at all seasons nourished. But in brutes it is connected with certain states of the body, whereby the young are produced at proper seasons of the year, and the process, which is one of expenditure to the system, does not by this means always go on, but they have leisure for recruit and for the gratification of their other appetites. Brute animals, therefore, have their organs sometimes in a state of inaptitude to fecundate; and when they are thus circumstanced, the disposition to copulation does not exist; but when the aptitude returns, then the disposition returns likewise, and this state is called *œstrum*. The œstrum of the mare is vulgarly termed *horsing*, and in other animals it has likewise popular terms. At these times considerable changes take place in the generative organs; they become highly vascular and sensible, and there are marks usually of general excitement throughout the system. The organs themselves swell, and a considerable quantity of whitish matter is secreted in the vagina, and ejected occasionally, termed the *heats*. Not only do the vulva and vagina appear to suffer this increase of vascularity *; but even the uterus, the cornua, the Fallopian tubes, and the ovaria, likewise participate. The Fallopian tubes at this time likewise shew a disposition to unite with the ovaria †. When, therefore, all these parts have become thus vascular, and the vesicles of the ovaria prove turgid, the animal is fit for fecundation; and if at this time copulation takes

* As *œstrum*, or *horsing*, appears in great measure brought on by an increased vascularity of these parts; so sometimes the inflaming or stimulating the vagina by artificial means, as by an infusion of cantharides, &c. has been practised, where it has been feared horsing would not occur, or that it would appear too late, and interfere with the foaling time of the next year. In some instances this practice is found to answer the end; but as it is unnatural, it must be very likely to fail; and when it does succeed, it will probably have an injurious effect on the mother or progeny, from a want of mutual consent of parts. Mr. Coleman, I believe, relates to his pupils two cases wherein this practice proved fatal.

† This periodical return of œstrum is a settled plan in Nature's economy, that the offspring might be brought forth under the most favourable circumstances to their well being. In the grazing tribes it occurs so that their progeny appear in the spring, when herbage is plenty, when the temperature is genial, and when time may be allowed to gain strength to bear up against the rigours of approaching winter. In the larger orders of herbivorous animals, the production of young is to this end limited to once a year, and in a state of domestication they remain subjected to the law, because man has not the power of altering or of forcing vegetation sufficient to produce abundant nutriment for them. But in the carnivora, and the lesser orders of even the herbivora, the powerful agencies of cultivation and artificial habits have materially altered many of the phenomena attending their reproductive process: and as shelter and nurture are found for them at all times of the year, so the periods of their œstrum or heat return at uncertain intervals, as confinement or highly stimulating food may hasten the sexual excitement. The domesticated dog will breed three or even four times in two years, while the wild dog and his congeners, in a state of nature, produce generally but once a year. The cultivated hog farrows in a few months from her former littering, while the wild hog brings forth progeny but once in twelve months.

place with a healthy subject, i. e. if the mare be covered with a healthy stallion, impregnation takes place through the means of the semen acting on the ovum or germ. That it so acts we have abundant proof; but whether it do so by actual contract, or by a sympathetic power, is yet undecided: although the balance of evidence is in favour of the actual transmission of the impregnating fluid through the uterus and oviducts to the ovarium; and which is rendered more probable by the circumstance that the ova of the multiparous animals never reach the uterus, but are retained in the cornua *. In a prolific copulation at this time, in multiparous animals several, and in uniparous one, of the ovarial vesicles bursts its outer coat, and escapes, leaving a greenish spot called *corpus lutea*. The vesicle that has burst its confinement is taken within the Fallopian tube, and conveyed into the uterus by a vermicular motion, which in some of the lesser animals, as in rabbits, it takes three days to effect, and perhaps it is not widely different in all. If a vesicle should burst, under the influence of the semen, and, escaping the fimbriated extremity of the tube, fall into the cavity of the abdomen, and the ovum should be nourished there, it is called an extra-uterine fœtus; and it is evident that the cavity of the abdomen must be opened to deliver it. There have been instances likewise of an impregnated ovum remaining in the ovaria and tubes, and yet coming to maturity. When the ovum has been brought into the uterus by means of the Fallopian tubes, it continues to float loose some time within it; but at last some changes appear to take place, and it becomes attached, not to any certain portion of the cavity, but wherever chance directs: but during this time there is no danger of its escape, for while the Fallopian tubes are bringing it, the womb is sympathizing in its action, and preparing for its reception, by effusing a quantity of coagulable lymph within it, which completely glues up the opening of the cavity into the vagina. This effusion likewise becomes general, and a thick lamen is formed, which Dr. Hunter first accurately described, and gave to it the name of *tunica decidua*.

Membrana caduca, *false* or *spongy chorion*.—This membrane Dr. Hunter found to consist of two lamellæ; that which lines the uterus, he named *tunica decidua uteri:* the other being reflected from the uterus over the ovum, he called *tunica decidua*

* In proof that the semen is not arrested within the vagina, but is carried into the uterus and ovary, Haller informs us he saw semen in the uterus of a sheep; Verheyneus, in a cow; and Ruysch asserts he observed it in the bodies of two women, who were killed immediately after copulation; the one by her husband, for infidelity; the other was a common prostitute, and was killed by a soldier, her paramour; in both which he states, that he found semen not only in the uterus, but in the Fallopian tubes. Mr. Hunter found it likewise in the uterus of a bitch who was killed in the act of copulation, or immediately after, by puncturing the spinal marrow. See also some interesting experiments in reference to this subject, by Dr. Haighton, *Phil. Trans.* 1797, p. 159; and by Mr. Cruickshanks, *ib.* p. 197.

reflexi. The tunica reflexi in the latter months of pregnancy adheres so firmly to the tunica uteri as to be no longer distinguishable into two. The ovum, it will be found, has two distinct tunics of its own; the external is more firm, less transparent, and vascular than the other, and is called the *true chorion:* the inner is a very thin fine membrane, termed *amnios.* These two coats belong to the fœtus strictly; for if the umbilical vessels be injected, these become injected likewise, but none of the injecting matter passes to the false chorion; and if the vessels of the mother be injected, the false chorion alone becomes filled, but the true chorion and amnios remain as they were. As this effect is constant, we are led to conclude, that the tunica decidua belongs to the mother, and the true chorion and amnios to the fœtus; and that, although there is a continuity of parts, there is no inosculation of vessels. To these involucra must be added another, which appears after the embryo is formed, and is called the allantois, as will be described hereafter.

The *embryo,* or fœtal foal, may therefore be regarded as being enveloped in the early months by four membranes; the *tunica decidua, tunica reflexa,* the *chorion,* and the *amnios;* and in the later months, from the disappearance of the reflexa by absorption, and the addition of the *allantois,* the number still remains the same. In the human impregnated uterus, if examined within the first month of gestation, there appears a prominent spot upon some part of the surface, and a similar projection on some part of the true chorion of the ovum: these two minute elevations in their respective surfaces inosculate with each other, and become finally a thick round cake called the *placenta;* and this forms the only communication between the human mother and fœtus. But in quadrupeds it is widely different: the ovum of the mare, after remaining some time within the cavity of the uterus, has the whole external portion of the chorion thickened and rendered vascular, by which it unites with all the surface of the membrana decidua; and this union takes place not only throughout the circumference of the uterus, but even throughout the cornua: and it may be remarked, that mares are the only animals at present known, except asses, whose placenta occupies the whole of the uterus. The æquine impregnated uterus, therefore, instead of presenting a solitary spot of attachment, furnishes a general covering of the ovum, propagating its connexion throughout the whole uterine surface and cornua. Before this inosculation takes place, the little contained animal, or rather the rudiments of the future animal, are nourished by the contents of the ovum; but now they derive their nutriment from other sources.

The *tunica decidua* we have described as being strictly a maternal portion of the uterus; that is, that though it is continuous, yet it has no inosculation of vessels with the fœtal portion; but that the vital principle is absorbed from the mother in the same manner as, in the adult state, it is effected by the ramifications of the pulmonary vessels in the lungs. This lamen is vascular and spongy, and is thence called the *false chorion*. The *true chorion* forms the next membrane of the uterine mass, but it forms in fact the first proper membrane of the fœtus. It is furnished, in the ruminant tribes, with fleshy prominences which correspond with cavities in the tunica decidua, and are called *cotyledons*, or *placentula;* appearing in themselves very vascular, but having no anastomosis of vessels, though the connexion is otherwise intimate and close. The *allantois** is a peculiar membrane whose existence in the human has never been proved; and in animals it differs much in regard to extent. In hogs and rabbits, it is little more than a tube; in ruminant animals it is more considerable, and forms a considerable sac between the amnios and chorion: but in mares, bitches, cats, and some other quadrupeds, it forms a general involucrum. It appears to be an expansion of a canal that arises in the fœtus from the bladder, continued to the umbilicus or navel, when it is reflected over the cord, and over the inner surface of the chorion, and outer of the amnios; so as to form an extensive cavity, destined, as is supposed, to contain the urine of the fœtus, for the fluid found within presents all the characters of urine. This canal, thus leading from the bladder to the umbilicus, is called *urachus;* and it is within this sac, and floating in this fluid, that the substances called *hippomanes*† are found; which appear not unlike portions of coagulable lymph, being from ten to fourteen or more in number, usually unattached, whose structure and use are neither of them understood. The *amnios* is a very fine but firm membrane immediately involving the fœtus, with the umbilical vessels ramifying upon its inner surface, and from which are secreted a fluid within the cavity, in which the fœtus swims till birth: this is called *liquor amnii*. It varies in qualities and appearance in different animals; and was originally supposed to be swallowed by the fœtus, or absorbed by his skin for nutriment; but it has been lately more generally supposed to regard the preservation of the fœtus from pressure, and for lubrifying the parts of the mother: in the early months of ges-

* The allantois presents in most animals singularities. In the ruminants it is partial, in others it does not exist at all; while in the canine and some of the feline genera its place is supplied by an expansion unconnected with the urachus, termed *tunica erythroides*.

† The hippomanes are not confined to the horse, but exist in the sow also: the old term therefore, of horse venom, is as inapplicable as the ideas formed by the antients relative to their adherence to the forehead of the foal, and that, as they were attached more or less firmly, they were omens of good or evil. The term hippomanes as used by Aristotle, Hist. An. 8, 24, refers to the mucus on the skin of a foal at birth, which the mother removes by licking; or, as in 6, 18, to the "*humor ex equarum equientium naturalibus distillans*."

tation its proportional quantity is much greater than in the latter months.

The *umbilical cord.*—The fœtus is connected with the organs which surround it, not only by means of the fluid in which it floats, but by means of vessels which pass from it to the expansion of the placenta. These vessels, together with the canal we have described, called urachus, are invested with coverings from the membranes, and some inner spongy gelatinous substances, and which united form a long rope of two or three feet in length, and an inch in diameter, which is called the *umbilical cord,* originating from the navel of the fœtus, and inserted into some part of the placenta. The vessels within this cord are two arteries and a vein, which are called umbilical; and it is by these that the communication is kept up between the foal and mother; for as these ramify throughout the placenta, and as the placenta unites intimately with the uterus, so it is evident a close union is kept up*.

Such are the parts which are particularly concerned in bringing the embryo into maturity, all which undergo great changes during pregnancy, both with regard to the fœtus, and with regard to each other. In the early periods of gestation, the coats or bags of the ovum form much its largest proportion; as gestation advances, the proportions become more equal; while, in the latter months, the fœtus is infinitely greater than its membranes. We have shewn how small a part the uterus formed when unimpregnated; it is surprising, therefore, how great must be its increase to contain such a quantity as it does in the latter months of gestation; but anatomy teaches us that it is not by a distention of its parts that it becomes increased, but by an actual growth and addition of them, gained from its additional vascularity; so that as it enlarges in size, it increases in thickness also. The fundus experiences this enlargement in the greatest degree, so as to stretch far beyond the cornua; extending up to near the epigastrium, pushing the large intestines on each side, so that the pregnant uterus lies upon the abdominal muscles. In this state it continues to increase, till, at last, the distention becoming greater than the capacity, its muscular fibres, powerfully assisted by the diaphragm and abdominal muscles, contract; by the joint action of which, the foal and its membranes become expelled. Parturition is not so difficult in quadrupeds as in the human; the human pelvis, from its situation, is necessarily much smaller, and the human fœtus has to make a considerable curvature in its exit: but, in brutes, the passage is direct, and the pelvis large; therefore there is less pain, and less occasion for a very muscular uterus.

* In the marsupial genera, although furnished with a complicated structure, there is no trace of an umbilical cord, but the fluid interposed between the parent and offspring is usually gelatinous: whether this supplies the place of a more solid connection, remains at present unknown.

Nevertheless, difficult parturition, as well as false presentation, occur now and then in mares, cows, and ewes. In bitches, particularly those much confined, these evils are very common.

The Physiology of Gestation, and the subject of the Breeding of Horses considered.

From what has preceded it may be gathered, that the semen of the parent (or its influence) by some means makes its way through the oviducts, where it vivifies the germ which now seeks a more proper receptacle, and passes into the uterus, to the parietes of which it adheres by placentation, while a glairy fluid shuts up the *os tincæ* of the womb from external communication, and, thus entombed, it rather vegetates than lives for eleven months. Thus produced by the mutual efforts of both parents, it has occasioned much enquiry among the curious, what proportion each took in the reproductive process, as regards the form and qualities of the progeny. Some have supposed that the male parent is principally concerned in giving the characteristic external form, while the internal organization was derived from the mother. With others the male influence is supposed to predominate throughout, and they conclude the mother to be a mere hotbed, wherein the seed is placed with its full stamp, to be simply reared. But an attentive examination of the subject, and a careful collation of facts, will prove that neither of these opinions are correct as fundamental principles. The general characteristic form of the animal is arbitrarily settled by Nature, but the individualities of character in the separate organs is divided between the parents in nearly equal proportions*. This is exemplified in the breed which arises from the intermixture of the blood with the cart breed, where the extreme difference in form and character is nicely blended, yet the peculiarities of each remain distinguishable†. This proves the great error committed by the generality of farmers and small breeders, who, careless about the dam, breed from any mare they happen to possess or can procure, though it may even be unfitted for work by disease or age; and expect, provided they gain a leap from a tolerable stallion, to procure a valuable progeny. But it is in

* It is by no means intended here to deny that the external characters of some breeds are not principally derived from the male, and at others from the female; but these anomalies, for which we cannot account, do not tend to alter the general similitude observed towards both parents. In the multiparous animals it is often observed that the influence of one parent preponderates in a part of the progeny, and of the other to another part of it Thus it happens that, when a pointer and setter breed together, it is not unusual to find part of the whelps almost perfect pointers, and the remainder as nearly true setters.

† The hybrid mule divides in equal proportions the æquine and assinine characters; at the same time it must be allowed that the hinny, or produce of the stallion and ass, is more allied to the horse than the mule, or progeny from the male ass and mare.

vain to hope for good form and useful qualities under such circumstances; for it will be generally found that the properties of each parent are equally proportioned in the progeny, and this fact is so well known to judicious breeders, that they select both sire and dam with equal care. This dependance on the law by which the distribution of form and qualities is equally dependent on both parents, leads to the correction of defects in particular breeds, by selecting one parent eminent for a form or quality for which the other is as notoriously defective. Should a mare, otherwise valuable, present a low heavy forehand beyond even that which is her sexual characteristic, by choosing her a male more than usually thin and elevated in his crest, the defect will be remedied; whereas if this be not attended to, whatever other properties each may possess, a serious defect is propagated and increased, and the produce can be of little value. It is also by a judicious attention to these circumstances that particular breeds are preserved with their original integrity, or new varieties introduced. Domestication has laid the foundation for these. The universal or inherent aptitude to retain the original stamp of nature becomes weakened as we subject animals to confinement and a life of art. Numerous deviations in size, form, and qualities, seem the necessary consequences of the physical and moral agencies which they become exposed to under these circumstances, and the extent of these deviations appears proportioned to the degree of confinement and restraint we impose upon them. The tendency to degenerate in our domestic animals, is counteracted by what is called cultivation, which, in fact, is opposing art to art; for as the subjecting them to an artificial life occasions the tendency to deterioration, so care in the selection of food, in the restraints imposed, and the opposing of disease, have so effectually combated the tendency, that our native and cultivated breeds now infinitely excel the originals. But all other arts would have failed, had not man taken on himself to regulate the sexual intercourse. It is by a judicious selection of individuals as parents, that the permanency of a breed must depend. It is by the choice of such as have the specified and definite form in the greatest perfection that we are enabled in the progeny to perpetuate the same, and by future selections to improve it. The merits and defects of each parent should be previously subjected to careful examination, and it is only by a judicious balancing of the one against the other that perfect success is to be expected. It is thus that our racers have outstript all competitors; it is thus that a Russell, a Coke, a Bakewell, or a Ellman, have raised our ruminants to their present state; and it is by the same art that a Meynell, a Rivers, or a Topham, have produced unrivalled dogs*. It should not

* Our powers over the animal form and qualities, by the selection of parents and subjecting their progeny to particular nurture, careful domestica-

be lost sight of, that qualities as well mental as personal are also to be cultivated and handed down in the breed; many qualities may be considered as dependent on the organization, such are hardihood, particular excellence in one pace, &c. These it may be expected, *à priori*, might be perpetuated; and we are not surprised at a son of Eclipse or Match'em having speed in his gallop, or the produce of a Norfolk trotter excelling in that pace; but it is not equally taken into the account that temper, courage, docility, and patience under restraint, are equally handed down in hereditary descent as the peculiarities* of form. A very long continued and rigorous confinement of the sexual intercourse, or, as it may be familiarly expressed, of breeding from particular races or families, only begets what is popularly known by the term purity of blood. When this is still more strictly confined to close consanguinity, it is called *breeding in and in*.

Very great importance is attached to this *purity of blood* or lineal descent among the breeders of almost every kind of domestic animals, but among none do we see it carried to such an extent as in the horse. The pedigree of many of our present racers can be satisfactorily traced back for 150 years, and many so recorded have never received one impure admixture†. Whether this lineal confinement is so very important as is insisted on by turf-breeders, admits of doubt, but many

tion, restraint and discipline, is truly surprising. The shepherd's dog is in some breeds born with a short tail; thus the very base of the machine, that which of all the parts is the least subjected to alteration by any physical or moral agency, the bones, even becomes subjected to our caprice. The Herefordshire ox can be bred to a white face, or a half white face, and the length of the horns of others can be ensured to an inch. The Spitalfields weavers assert, that they can ensure almost to a certainty in the Marlborough breed of spaniels, which flourishes among them, any given quantity of colour, length of coat, texture of it, and regulate its disposition to curl or remain straight. The colour of the game cock is arbitrarily imposed by the handler and feeder; and the experienced pigeon-fancier can breed to a feather.

* Standing or pointing in dogs (as practised after game) is wholly a cultivated quality; and yet many breeds of pointers take it without breaking, not only pointing game of their own finding at a few months old, but backing others which have also found game. Here quality is clearly descended.

† English blood stallions have been sold for 1,000 guineas to breed from, bulls for 300, and rams the same. Fifty guineas have been given for a leap from some horses: bulls and rams have been let at enormous prices for the same purpose; and the celebrated Yorkshire greyhound *Snowball* lined bitches at three guineas each: in such estimation are particular breeds held. In Arabia, however, so much importance is attached to *purity of blood*, and regularity of descent, as to leave our attention to these particulars far behind. None but stallions whose descent can be traced for generations, are allowed access to their mares, and of these, those of the finest form are selected. To attest the genealogy, the intercourse always takes place in the presence of a professional witness or public officer, who certifies the fact, records the names, and signs the pedigree of each. The Circassians distinguish the various races of their horses by marks on their buttocks; and when a noble mark is put on an ignoble breed, the forgery is punished with death.—*Pallas's Travels in the Southern Provinces of the Russian Empire.*

eminent characters maintain that they can detect even the slightest cross, in form and qualities, to the sixteenth generation. *Breeding in and in,* as already noticed, is a still more close attention to lineal descent, and confines the intercourse to the closest affinities. From an opinion that Nature had placed both physical and moral bars in the way of such intercourse, the eligibility of the practice has occasioned much dispute. In the last edition of the *Canine Pathology,* I have endeavoured to examine this subject fully and clearly; in this place my limits will only allow of a more brief notice of it*.

* In favour of breeding consanguinity, it may be alledged that the early human as well as brute races were forced into the nearest affinities; and it is unreasonable to suppose that Nature would have made her very first essay by a principle tending to the immediate deterioration of her works. This has been called a mere argument of necessity, and is said to apply only to that precise period when no other connexion was possible. But we have it not in proof that Nature departed from any of her known laws in this instance; on the contrary, we have every reason to believe that they were immutably fixed on unerring and undeviating principles, *ab initio.* Neither does the argument refer alone to these early times, for we know that for ages afterwards consanguineous marriages were comsummated among nations of some refinement and great personal endowment and prowess. The Egyptians allowed of the marriages of brothers to sisters: the Athenians admitted the betrothing of brothers and of the half blood, if related by the father's side. The marriage of Abraham with his sister, assures us that it was practised among the Chaldeans; and if history be correct, when this island was conquered by Cæsar, a consanguineous and peculiar cohabitation prevailed.—"Uxores habent deni duo denique inter se communes, et maxime fratres cum fratribus, parentesque cum liberis; sed si qui sunt ex his nati, eorum habentur liberi, quo primum virgo quæque deducta est," *Paley's Nat. Phil.*—Did there exist in nature any moral or physical reasons that near consanguineous intercourse tended to deteriorate the organization, would she not have implanted an instinctive aversion in animals to such union, as she has done with regard to the different genera, purposely to keep her works free from deterioration, and that the perfection of her forms might not be lost in promiscuous hybrideous productions? I am aware that it may be argued as far as regards man, who is at the head of Nature's tree, that such aversion is manifested in the political restrictions which have prevailed among all enlightened nations of the present day, relative to consanguineous marriages. But it does not appear that these laws were framed with any view to the physical necessities of the case, but merely as regarded the political and moral bearings of it; which were sufficiently powerful to make such restrictions prudent and necessary. By extending the social compact to marriages without the family pale, communities were enlarged, knowledge and the arts were extended, improved, and became a common property; wealth was diffused, and social interests joined those who before were in opposition to each other. It may also be added, that the demoralizing and depopulating effects of an early departure from chastity, which unreserved family communication led to, was prevented. It is, however, clear from the closest philosophical enquiry, that such aversion in neither instinctive nor physically necessary; but that as regards the human it is an acquired regulation of passion, very properly implanted by education, and made general by refinement. This fancied aversion, which has been a theme for poets and historians, has carried some of its votaries so far as to aver that it has been observed in the brute creation also. Varro says, "Equuo matrem ut saliret adduci non posset," *De Re Rustica,* lib. iii, c. 5. An ingenious commentator has, however, justly observed, that subsequent experience has not justified the assertion, and we know it to be false.

I have there stated, that though I am by no means wedded to an opinion that no evils result from these very close connexions, when confined to families for many breeds, yet that I am inclined to think there are none, because not only do the testimonies preponderate that way, and reason and analogy justify it, but also because, with the utmost attention I could pay to the subject, I have never discovered any deterioration of form or quality in animals thus bred. As we proceed through the whole scale of animal creation, we shall, I think, find a consanguineous intercourse even among the nearest affinities as little hurtful to the form and properties: we are assured that the Arab horses of the best blood are bred *in and in,* and as these horses have the greatest possible attention paid to them, the deteriorating effect of such a practice could not have escaped observation, had it existed. Mr. Bakewell reared his valuable stock wholly from family alliances, and in fact his improvements were founded on confining the intercourse to relationship; Mr. Meynell bred most of his celebrated foxhounds from the nearest affinities. I could quote innumerable other authorities in favour of *in and in* breeding, but candour obliges me also to own, that there exists a large number of able antagonists to it also. My limits only allow me to add, that many practical breeders, who are averse to breeding in succession from near relationship by blood, are favourable to it in a remote degree, which is particularly the case with some rearers of game fowls, who seek the intercourse of a third remove, which they call a "*nick.*" From these conflicting testimonies the matter will, with many, be considered as problematical: with me the only arguments against it, which it appears cannot be satisfactorily answered, are that as hereditary diseases in some breeds are considerable, by this mode of breeding, they would be perpetuated and probably increased; and likewise, that when breeding by relationship is a settled practice, accidental defects are too apt to be passed over unobserved.

From all that has been detailed, it may be gained that the great work of reproduction is mutually divided between the parents, but that the exact line of division between their separate parts is not easily ascertained. Even the imprinting the sexual stamp on the ovum has, by some, been attributed to male influence*, and by others, to female preponderance. On this subject, I think it probable that the ova are originally formed with their true sexual character imprinted on them, and that some females have ovaria with the sexes equally divided among the ova, while others, from causes unknown to us, have them very unequally so; but even this point may be fairly disputed from facts† which occasionally occur.

* Dr. Garthshore on "A Remarkable Case of Numerous Births, with observations."—*Phil. Trans.* 1787.

† Some physiologists (and among them Sir E. Home) have supposed that the

Breeding back.—While on this subject, it falls in order to glance at a very curious phenomena in the reproductive system, popularly known by the term of *breeding back*, by which it would appear as though the ova or germs of the future race were originally formed after one common mould, and which, if it were not for accidental circumstances and foreign commixtures, would always bear the same stamp. It is thus observed that the progeny of the horse, of man, and most domestic animals, shall bear a more striking resemblance to the grand dam, or grandfather, than to their immediate parents. It is evident that this is more likely where a common character has been preserved during successive generations, or, in turf language, where the blood has been preserved pure. A practical hint naturally presents itself on the extreme importance, therefore, of admitting no accidental admixture of blood, where it is peculiarly requisite that it should flow in true lineal descent; seeing that its debasing consequences are carried through whole generations, and unexpectedly appearing in a third or fourth. In the anatomical detail of the impregnated uterus, it

ovum or germ, previous to impregnation, is of no sex, but is so formed as to be equally fitted to become a male or female fœtus, and that it is the process of impregnation which marks the sex, and forms either male or female generative organs*. This gentleman, in his most interesting memoir on this subject, detailed in the Phil. Trans vol. lxxxix, p. 175, draws a picture of these organs until the fourth month, in which it would appear that hardly till that period is the sex confirmed, but that the parts previous to that are so blended, that it is not difficult to form either the one or the other therefrom, as a tendency towards the form of the father or mother may preponderate. In this way it would not be difficult to account for the disposition which some stallions, some bulls, and some dogs, have to beget a greater number of males than females, and *vice versâ*. The same is observed in the human. In the Phil. Trans. 1787, p. 344, mention is made of a gentleman who was the youngest of forty sons, all produced in succession from three different wives, by one father, in Ireland. In the church of Kings Langley, Herts, are the effigies of seven successive daughters born to a man by his first wife, and of seven sons the produce of his second wife, in succession. Mr. Knight, a most intelligent naturalist and attentive observer, is favourable to an equal aptitude in the female in determining the sex. He says, " In several species of domesticated animals (I believe in all), particular females are found to produce a majority of offspring of the same sex; and I have proved repeatedly, that, by dividing a herd of thirty cows into three equal parts, I could calculate on a large majority of females from one part, of males from another, and upon nearly an equal number of males and females from the remainder. I frequently endeavoured to change the habits by changing the male, but without success."—*Phil. Trans.* 1809, p. 397.

* Under this view, some physiologists have considered several extraordinary phenomena of gestation readily explained; for whenever the impregnation falls short in stamping its full character on the ovum, not only the secondary parts, as the labia preputium, clitoris, penis and mammæ, which appear so contrived as to be equally adapted to the organs of the male or female, and, therefore, by some curious anomaly, may readily be blended, but also the testicles may be substituted for the ovaria, or neither an ovarium or testicle, but an organ bearing a resemblance to both, may be formed, and may either remain in the natural situation of the ovaria, or pass into the situation proper for the testicles, or the labia pudendi of the female. In this way hermaphrodites are formed, of which an instance in the horse is given in Mr. Sewell's Reports; and this, it is supposed, will account for the free martin among cattle, and also why twins are usually of the same sex, and that, when otherwise, the female has usually less of the female character, and frequently does not propagate.

is seen how very small is the organic connexion between the mother and fœtus: the compact between them is mysterious, yet influential and intimate, as numerous phenomena in gestation shew us*. That her organization, her qualities, and even her diseases, are imprinted on her offspring, is hardly to be wondered at; but how are we to account for the effects which even her imagination has over the young within? and that such is the case we have innumerable proofs. As early as the patriarchal time the fact was known, and acted on. These anomalies in the gestation of the horse are less frequent than in the more closely domesticated animals, as dogs; yet there are not wanting instances of these mental impressions sinking deeply into the mind of the mare also, and being called into recollection and action in every future pregnancy†. To some particular morbid action of the maternal mind, in some instances, and in others to the presence of a second ovum, which becomes connected with or pressed into the other, we are to attribute monstrosity, but which is not often observed in the horse. In the multiparous animals, impregnation does not always take place at the first intercourse. It often requires several copulations to effect it, and there is reason to suppose that the prolific ova are neither all impregnated at the same time. Thus in dogs some days, and even a week, has elapsed between the birth of the first and the last pup, and superfœtation, which is not uncommon in dogs, is a decisive proof of it. In the mare it is otherwise: she usually is impregnated by the first intercourse, provided her œstrum be complete, i. e., if she be in full season; and in her superfœtation has not, I believe, been found to occur. In æquine gestation it is not observed that the stomach sympathizes with the early stages of pregnancy, as in the human and some animals, particularly in dogs, which frequently are considerably affected by it. As pregnancy advances, the form of the fœtus becomes developed. The more material parts first appear, as the head, with the brain, and the organs of sense; then follow the heart, lungs, and abdominal viscera. During this state, although it has a

* Can this influence be received by sympathy, or is it by organical moleculæ received by the fœtus? From the circumstance that the milk of a fostering mother is known to have an effect on the organization and qualities of the adopted, there is reason to consider it as probable.

† Lord Morton bred from a male quagga and a chesnut mare. The mare was afterwards bred from by a black Arabian horse; but still the progeny exhibited, in colour and mane, a striking resemblance to the quagga. D. Giles, Esq. had a sow of the black and white kind, which was bred from by a boar of the wild breed, of a deep chesnut colour: the pigs produced by this intercourse were duly mixed; the colour of the boar being in some very predominant. The sow was afterwards bred from by two of Mr. Western's boars, and in both instances chesnut marks were prevalent in the latter, which in other instances had never presented any appearance of the kind.—*Phil. Trans.* 1821. See many other instances detailed in the *Canine Pathology*, 3d edition, p. 94.

life of its own, yet this life is very simple; for it may want brain, heart, and many of the other organs absolutely essential to the adult state. At this period, therefore, its existence is nearly vegetative; it draws its supplies from the parent by means of its circulation, but its organs are passive. The gestating period of the mare is usually considered as eleven calendar months. According to the observations of M. Tessier, of 102 mares, three foaled on the 311th day; one on the 314th; one on the 325th; one on the 326th; two on the 330th; forty-seven from the 340th to the 350th; twenty-five from the 350th to the 360th; two from the 360th to the 377th; and one on the 394th; which gives a latitude of 83 days: but 21 days is the latitude which these periods usually range between. The cow takes about nine months as her gestatory period; the sheep, five months; swine usually farrow between the 120th and 140th day, but they exhibit variations in this particular, according to size and breed. Bitches pup near the 63d day.

The Fœtal Colt.

The gestatory period being fulfilled, the fœtus escapes from its uterine imprisonment, and seeks a new life; into which it bursts with its organs of immediate necessity fully developed. Unlike the human young, and those of many other animals, it is far from indigent; but at once possesses the full powers of locomotion, and performs many of the common phenomena of life with dexterity and ease; to enable it to do which, its organization exhibits some speciality, which we shall notice*.

* When we consider the economy of quadrupeds, and their particular structure, so wisely adapted to their intended habits, we ought not to regard them in the narrow and confined view to which we have subjected them by domestication, which is wholly a life of art, and, as such, unnatural; for, though Providence has given us this power over them, and undoubtedly designed them to be subservient to our use and comfort; yet it was not probably intended that such an utter perversion of Nature's dictates should have taken place, as has been introduced by luxury and refinement. Considering the habits of the animal in question, philosophically, we must regard him as living uncontrolled and in common with other animals, many of whom wage eternal war with him, and from many of whom he is to escape by flight. He is likewise to be regarded as being destined to rove in search of food, perhaps to considerable distances: for in a state of nature where these animals congregate, that is, where they associate in herds; the scanty provision raised on one spot, without the assistance of agriculture, would not long suffice the wants of a numerous assembly of wild horses; and our physiological examination of his organs should be directed towards a capability for this kind of life; and we should not draw our inferences from the nurture of the stable, or the education of the riding house. Regarding him therefore aright, we shall find the structure of this noble animal admirably adapted to his economy: the young colt, as soon as foaled, appears capable of making considerable exertions, and is possessed of great speed; by which he can accompany his mother and the associated herd, either in flying from their enemies, or in search of food; and if we examine him attentively, we shall find his exterior form as well as his internal economy admirably adapted to this: his body is very slender, and consequently very light, and his legs long, by which he can reach his food,

Fœtal circulation.—To describe the mode in which the blood proceeds, and in which it gives out nutrition in its course to the fœtal system, we must again recognise the placenta. From what has been said, it may be remembered, that this mass is formed of the true chorion and tunica decidua united together; and that, though both of these are intimately united in one body, yet that it is only by a contact of parts, without an inosculation of their mutual vessels: consequently, that they were to be still regarded as two separate portions, because two distinct circulations went on within them; thus the part immediately connected with the uterus, and formed from the tunica decidua, is called the *maternal portion of the placenta;* while the other half attached to it, and formed from the outer surface of the chorion, is called the *fœtal portion of the same placenta.* Into this part the umbilical arteries terminate; and it must be remarked, that the blood within them is dark and venous. These arteries do not ramify, in the usual arterial manner, by an exhaling outlet, and a returning vein; but the branches first unite very freely with each other, and then terminate wholly in returning veins; for if we pass injection by any one branch, it fills the arteries around, and likewise the veins throughout the system; but the maternal portion of the placenta is left uninjected. In the maternal portion, on the

the milk; and by which he is also enabled to exert very considerable speed without making any greater exertions than his juvenile state will admit of. On the contrary, in animals who seek the safety of their young by hiding them in holes and caverns, where it is necessary for their preservation that they should remain quiet, Nature has wisely given them a correspondent form; their bodies are fat and unwieldy, that thus they may have a constant disposition to rest and sleep; and which is further brought about by their being blind. Their legs also are short, so that every impediment is placed as a bar to their roving till they possess something like the parent strength, and the parent intelligence: but the internal economy of the foal is such, that he has no need of much sleep to quicken digestion; for, in him, the process of solution is not carried on in the stomach wholly, but in the intestines likewise: therefore he can be always alert and on the look out to avoid surprise. In the stately herds of horned cattle likewise, though the calf can make considerable exertions at birth, yet there is not that studied attention to his speed, and the safety of the offspring consists in the means of defence given to the parent by its formidable horns; and, therefore, to them Nature has given a greater degree of ferocity when they have young, that they may make use of these means; but, in the mare, who has them not, she is stimulated to trust more to flight than resistance. Therefore, that the evolution of the parts of the colt at birth might be such as to admit of these necessary exertions, we find a considerable peculiarity in the gestation of his mother; for, by the very extensive attachment of the placenta to the whole surface of the uterus and to the horns, the blood must be much more oxygenated; there must be likewise a much greater quantity of chylous nutriment, and hence the organs of necessity are more completely evolved at birth, and fitted to greater exertions. By this means it is that his pelvis is completely ossified when foaled, and many of the epiphyses of the bones likewise, which, in the human infant, remain cartilaginous for many months afterwards; and it is for this purpose, it is more than probable, that the very extensive attachment we have pointed out, is permitted in the uterus of the mare.

contrary, the arteries penetrate it from the uterus, and terminate in an exhalent orifice, and a returning vein. This exhalent orifice deposits a fluid of a chylous quality, and which becomes introduced into the blood of the fœtus; but whether this be effected by the medium of absorbents, or whether it be poured directly into the returning veins, does not appear altogether certain: but it is probable, that it is effected by absorbents, which, though they are not very evident, yet may exist, and, in some late injections, are actually said to have been discovered. This is rendered still farther probable, from the circumstance that madder given to a mare has been known to tinge the foal. By these means, therefore, the blood which has circulated through the fœtus, and is now returned by the umbilical arteries, and which blood is necessarily impure and venous, becomes changed, by absorbing oxygen from the cells of the maternal portion; though it is not oxygenated in an equal degree to that which takes place in the lungs in the adult state. It likewise gains an addition to its quantity from the chylous fluid it absorbs; and from these joint changes it becomes vivified and fitted for the support and evolution of the fœtus. Thus, therefore, the placenta forms the true fœtal lungs; in fact, it forms also the true fœtal stomach; and it may be said to be the organ that possesses the specific power of all the aerating and chyliferous organs combined, while the organs themselves only enjoy the life fitted to their evolution, but not adapted to their specific action. As the blood of the fœtus draws its oxygen from the placenta, so it must be evident, according to the modern doctrines, that the vital heat of the fœtus is derived from this source. But as we have stated the oxygenation of the fœtal blood to be not so complete as that of the adult, so the heat evolved is probably less; less however is necessary to the fœtus, for it is surrounded by a high and uniform temperature. The fœtal blood so changed is gathered up by the minute divisions of the veins of the fœtal portion of the placenta, which gradually unite to form one trunk.

The *umbilical vein* is this trunk, which passes in a spiral manner with the cord through the umbilicus, or navel, where it leaves the urachus and the umbilical arteries, and proceeds to gain the sinus of the vena portæ, into which it pours its whole contents, to be by that means circulated with the blood of the abdominal viscera. It is at once evident that here a great speciality presents itself; for in the human, and in all other animals that have been examined, except the ass, there is a considerable branch of the umbilical vein, which, by communicating with one of the hepatic venal trunks, appears to intend, that part of the blood shall purposely avoid this circuitous route; and which peculiar communication is called *canalis venosus*. In the horse, however, and his counterpart, the ass, the whole of the fœtal blood circulates through the liver, and which it is remarkable that the early French veterinary anatomists were unacquainted with; for Bourgelat, La Fosse, and Vitet, all describe a canalis venosus in the fœtal horse. The cause of this peculiarity, therefore, becomes a very natural subject of inquiry, and which an attentive consideration of the foregoing remarks will, probably, bring to light. We have shewn that in the fœtus, or unborn colt, the glands and other organs have only growth to perform; but they have no *specific action*, and as such they must be merely in a state of capacity: thus, therefore, they have need only of blood of such purity as is necessary and sufficient to the growth of parts, but not fitted to their specific action: for were such specific action to take place, that is, were the liver to secrete bile, and the kidneys urine, and so with the other glands, the destruction of the fœtus must be inevitable; we, therefore, find that Nature has introduced a contrivance purposely to render the blood less pure, that the *specific action* of parts might be prevented.

As the maternal placenta only vivifies the fœtal blood in a secondary manner, that is, after it must have given out some of its oxygen; so, it is evident, the blood of the umbilical veins, when first received, is only in a comparative state of purity; and as it passes towards the heart in most mammalia, except the horse, it mixes part of its blood with that circulating through the liver, by which it must be rendered still more impure: and here we can but admire the peculiar wisdom displayed; for as the liver is the only gland that secretes from venous blood, that its specific action might not be employed at this time, it is so arranged that it shall receive purer blood than any other organ. Neither is it to be wondered at, that there should be some curious speciality in this instance, seeing that, as the placenta in the mare is connected with the whole surface of the uterus, there must consequently be a very great absorption of oxygen from this extensive attachment. Nor does this at all tend to destroy our former argument, that this large surface was for the purpose of taking up a greater quantity of nutritious principles; for it has been already stated, that these are of two kinds, the aerating and chyliferous; the former of which only is here less necessary, the latter is purposely intended for the evolution of the parts, and is consequently in full action. From the liver the blood is passed into the vena cava, and from thence to the right auricle; but it does not from this pass into the right ventricle, as in the adult horse; but a part of it escapes through an opening in the septum of the heart, between the right and left auricles, and at once enters the left auricle, from whence it is prevented from returning by the eustachian valve. This opening, called the *foramen ovale*, closes up as soon as respiration takes place. The remaining blood passes, as in the adult, into the right ventricle, and from thence into the pulmonary artery. Here, again, another great contrivance is placed to prevent the fœtal blood from going through the lungs, and which would be unnecessary, as these organs likewise have only growth to perform, but no change on the blood to effect: hence, therefore, there is in the circulation, at this early period, a communication between the pulmonary artery and the aorta, by means of an additional lateral trunk, called the *ductus arteriosus;* through which the greater part of the blood escapes at once from the right to the left side, without taking the circuitous round of the lungs. As the fœtal blood is not so perfectly oxygenated as it is in the adult state, by the intervention of its own organs; therefore the round of circulation is advantageously shortened, and it is more quickly returned. Yet still some blood circulates through the lungs, and, besides which, the bronchial artery is considerable; so that the same ends are apparently kept in view here as in the liver; both are organs whose use is immediate and necessary at birth, therefore both must be completely evolved, and both must consequently receive an additional quantity of blood, but not for especial purposes. That which circulates through the lungs is returned in the usual way into the left auricle, where it meets with what had escaped from the right side of the heart, through the foramen ovale, from whence it passes into the left ventricle, and from thence into the aorta, to join with that received by the ductus arteriosus, and is distributed over the body in the usual manner; but, at the bifurcation of the aorta, there are given off two considerable arteries.

The *umbilical arteries.*—At the bifurcation of the aorta are given off two considerable arterial trunks, called umbilical, which in the human, and, I believe, in most animals who are born indigent, originate from the internal iliacs: but, in the horse, and a few other large mammalia, they arise as above. The reason of this speciality appears to be, that the lower extremities might have a more considerable proportion of blood than usual, by which means they become more fully evolved at birth, and enable the animal to bear the superincumbent weight without injury, and to make considerable exertions immediately, as we observe the colt is able to do. The umbilical arteries then pass down towards the bladder, one on each side, where they join the urachus, with which they are continued out of the abdomen by the navel and along the umbilical cord, to be ramified in the way we have already described. The colt, ushered into the world, finds an immediate necessity for the organs of aeration and chylification. The organs for the first process are fitted to be brought into immediate action at birth, and the colt respires as perfectly the first hour as at any future period; but the addition to the quantity of the blood is to be brought about by parts which have not yet gained sufficient strength to enter into immediate and full action*; they, therefore, have a food prepared for them, which contains nutriment in a concentrated form, already masticated, and partly digested and animalized: this food is the *milk* of the mare, and the same consent of parts that first made her feel œstrum, and propagate from the embraces of the male, produces this secretion; and this sympathy still remains, for she continues to secrete, and to regard her offspring as a part of herself; and thus she nurtures, rears, and protects it, till, from the complete evolution of the organs of the offspring, it is fitted to perform all the parent acts, when, being able to counteract its own wants, it sympathizes only with itself; while the parent-mother's care being also no longer necessary, her secretion ceases, and she likewise sympathizes only with herself: her generative organs prepare anew for the same great work; for the mutual dependence being lost, she again feels œstrum; while her foal grazes, digests, and shifts for itself.

The management of mares during pregnancy, and that of the foal afterwards, is in general confined to the care of the agriculturalist; but some leading principles will be borne in mind by the veterinarian. A pregnant mare should be allowed a sufficient quantity of nutritious food. If she be stinted in this particular, her secretions will be lessened, and the offspring will suffer. It is common to work most pregnant mares, except those of full blood, and the custom, when not carried too far, is not attended with any apparent ill effects: but when mares in foal are too long or too hard worked, the same or worse consequences follow than arise from bad feeding. They also are apt to get strained or over-heated, and then abortion is often brought on. Æquine pregnancy is subject to few diseases; accidents, however, particularly kicks from other horses, are apt to frustrate the hopes of the owner. Standings with bails, and close confined pasturage with other horses, should therefore be avoided.

When *the foal is at the foot,* as it is termed, that is while young and sucking, the same cautions with regard to association are to be taken. With the more ordinary breeds, it is by no means a bad custom to work the mother with the foal as her companion, provided it be done so moderately as neither to endanger over-heating the mother, nor tiring the foal. By these means the youthful horse is rendered hardy, tractable, and familiarized with the objects he is in future to associate with. *Weaning* usually takes place at six or seven months after foaling, at which time the foal should be removed from the sight or hearing of the mother, or injurious consequences

* The wisdom of thus making the offspring still dependent on the parent, is at once evident. If it could masticate and digest as an adult, it might be tempted to stray, when its weakness and want of experience would make it a ready prey to other animals.

may arise to both. The colt or filly should at such times be nutritiously fed, and housed from rain and cold, by which means it will become better nourished, and consequently the form will be improved. At twelvemonths it is the custom to castrate colts, but the period when this is proper should be determined by the growth and form of the animal. (See *Castration.*) In some cases, when the mare is wanted for immediate and severe exercise soon after foaling, a foster mother is procured; or the foal is reared by cow's milk. But the practice is not a good one, for, by some sympathetic connexion kept up between the organs which secrete the milk and those which are to receive it, a similarity is diffused between the giver and receiver, without actual participation of relationship; and the progeny is apt to partake of the qualities of the foster mother, which, as being in general an inferior one, produces injurious consequences.

Section XVII.

THE STRUCTURE, FUNCTIONS, AND ECONOMY OF THE EXTREMITIES.

In human anatomy, it is usual to blend the description of the extremities with the other parts of the body; and in most other cases we have accommodated ourselves to the methods used in such teaching: but as progression forms the most material of the functions of the horse, as regards his utility to mankind, so the most marked attention must be paid to the parts, whereby this progression is effected; and the more as they are found, from the life of art we subject the animal to, particularly prone to disease; therefore the structure, functions, and economy of the extremities, become matters of peculiar import; and, as such, we shall treat of them separately.

Description of Plate VI.

This plate is merely intended to give an outline of the muscles of the superior parts of the fore and hinder extremities, as those of the thigh and shoulder.

Fig. I—Represents the muscles of the shoulder; *a*, trapezius; *b*, the common muscle; *c*, abductor longus humeri; *d*, abductor brevis humeri; *e*, postea spinatus; *f*, antea spinatus; *g*, postea spinatus minor; *h*, pectoralis minus; *i*, pectoralis magnus; *k*, serratus major; *l*, part of the fascialis cubiti; *m*, triangularis; *n*, biceps extensor cubiti; *o*, part of the biceps flexor cubiti; *p*, part of the common muscle, and which is the only one that is described by some authors; *q*, rhomboideus minor; *r r*, the ligamentum colli, cervical ligament, or fix fax of the neck; *s*, extensor cubiti intermedii.

Fig. II—Represents the muscles of the inside of the shoulder; *a*, subscapularis; *b*, flexor radialis anticus; *c*, flexor brachialis anticus; *d*, brachialis

Fig. 3.

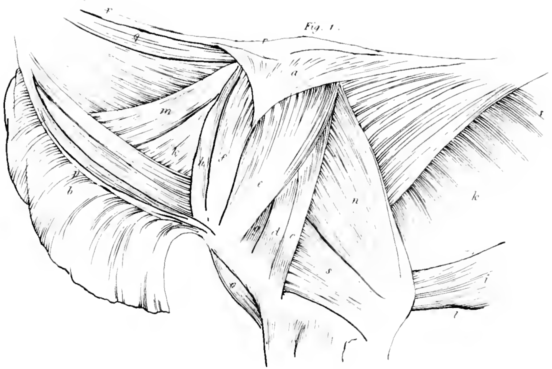


Fig. 1.

Fig. 4.

Fig. 2.

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Plat. 7.

Fig. 1

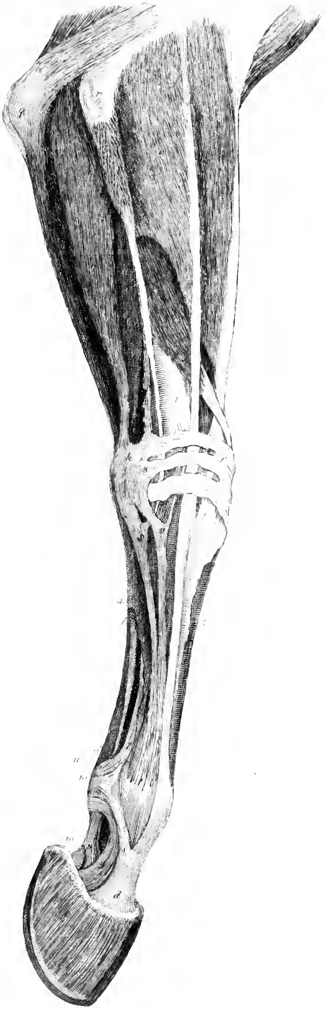


Fig. 2

internus; *e*, biceps extensor cubiti; *f*, fascialis cubiti; *g*, latissimus dorsi; *h*, antea spinatus; *i*, triangularis; *k*, serratus major; *l*, rhomboideus major; *m*, coraco brachialis; *n*, adductor humeri; *o*, rhomboideus minor; *p*, pectoralis minor; *q*, insertion of the pectoralis magnus; *r*, insertion of the sterno brachialis; *s*, the fascia of the fascialis cubiti.

Fig. III—Represents the outside of the buttock and thigh; *a a*, semi membranosus; *b*, biceps flexor cruris; *c*, *d*, flexor cruris posticus; *e*, gluteus minimus; *f*, gluteus maximus; *g*, tensor vaginæ femoris; *h*, vastus externus; *i*, the anus, with its sphincter.

Fig. IV—Inside of the thigh; *a a*, triceps adductor femoris; *b*, gracilis; *c*, pectineus; *d*, psoas parvus; *e*, psoas magnus; *f*, iliacus internus; *g*, part of the tensor vaginæ femoris; *h*, sartorius; *i*, part of the rectus cruris; *k*, part of the vastus internus; *l*, part of the flexor cruris posticus; *m*, gastrocnemius.

THE ANTERIOR EXTREMITIES.

Description of Plate VII.

This plate represents two views of the fore leg, with the outer integuments removed, and the fascia taken off so as to bare the muscles. In both figures the utmost care was taken to preserve the natural appearance, so that the pupil might place them before him as a reference when dissecting.

Figure the First

Represents a lateral, and rather front view of an off fore leg; *a*, extensor metacarpi magnum; *b*, its termination at the tuberosity of the canon; *c*, extensor longus pedis anticus; its fibres pass into the white band, at its outer part, which is its tendon; it proceeds down under the annular ligaments, and widens as it goes over the knee, where it gives off, in a peculiar manner, a little tendon which joins the intermediate anterior ligament; *d*, the termination of the extensor muscle of the foot into the anterior and superior part of the coffin bone, first receiving the suspensory bifurcating ligament; *e*, extensor metacarpi radialis; at *f*, it passes obliquely round the knee, to be inserted into the inner side of the canon; *g*, flexor metacarpi externus; *h*, its partial insertion into the head of the outer small metacarpal bone; being afterwards continued over this part of the knee, to blend with the anterior ligaments; *k*, one head of the flexor pedis perforans anticus; *l*, its exit from under the tendinous expansion of the knee, invested by the perforatus tendon; *m*, its termination in the foot; *n*, part of the flexor perforatus anticus; *o*, its tendon investing the perforans, and continued through the ligaments of the fetlock; *p*, its insertion by two portions, one on each side of the bottom of the pastern, some fibres being continued on to the little pastern, or coronary bone; *q*, the point of the olecranon, or elbow; *r*, the head of the radius, from which is seen to arise the extensor metacarpi radialis: its tendon is continued down very small, and unites with the outer anterior ligament, under the annular, to be continued with it; *s*, the outer anterior ligament formed from an expansion of the flexor metacarpi externus, receiving the small tendon of the little extensor, and continued with it down to *t*, to be inserted into the head of the pastern; *u*, the intermediate anterior ligament receiving the tendon of the extensor of the foot, and continued with it to be fixed at *v*, in the same manner with the former.

1. The tibia; immediately below this is seen some lines which describe the capsular ligaments of the knee joint, arising from the inferior part of the tibia. 2. The loose floating edge of a very strong ligamentous or tendinous expansion, formed from a continuance of the fascia covering all the knee, and forming its annular ligaments: it is continued down over the back sinews, half way along the leg. 3. The annular ligaments; the portions cut out are thinner than the rest, and shew the tendons passing underneath, and the capsular ligaments of the knee joint. 4. The tendinous expansion of the knee proceeding down over the flexor tendons, after which it becomes loose and slight, but is continued on to the ligaments in front, and to the extensor tendon, and from thence to

the inner metacarpal bone. 5. Its edge, where it is cut from the canon, which appears beyond it. 6. The outer metacarpal bone, having the tendinous expansion running down, adhering to it, and which at its bottom part is continued as a ligament on the pastern. 7. The suspensory bifurcating ligaments, forming a support to the sessamoids, and likewise to the fetlock; and passed on to the extensor tendons of the foot at 8.—9. Under the expansion of the flexor tendons and bifurcating ligaments are seen the ligaments of the pastern and coronet. 10. The expansion of the suspensory bifurcating ligament, passing around the ring of the perforatus. 11. The bursa mucosa that surrounds the tendon at this part; the dilatation of which forms windgalls.

Figure the Second.

a, Flexor metacarpi internus, is seen to run at its lower part under an annular ligament; *b*, flexor carpi cut off from its origin at *c*, to shew the muscles underneath; its posterior part passes within an annular ligament to its insertion; *d*, flexor pedis perforatus, or perforated muscle; *e*, *f*, *g*, three heads of the flexor pedis perforans, or perforated muscle: its tendons enter within the annular ligament, under which they are seen passing separately; *h*, extensor metacarpi magni; *i*, part of the biceps flexor cubiti; *k*, part of the extensor cubiti intermedii; *l*, part of the biceps extensor cubiti; *m*, the humeral vein forming its branches; *n*, the branch forming the plate vein; *o*, the humeral artery; *p*, the three branches of the humeral nerves; *q*, the inner condyle of the radius; *r*, a ligament running from the posterior part of the radius, into the tendon of this head of the flexor of the foot; *s*, another ligament running into each side of the perforated tendon, arising immediately at the origin of the bifurcating ligaments; *t*, the continuation of the perforated tendon, at which part it is completely perforated, and forms a perfect ring for the perforans; *u*, the termination of the perforated tendon; *v*, the flexor of the foot, or perforating tendon; *w*, its termination; *x*, bifurcating ligaments; *y*, their junction with the extensor of the foot; *z*, the inner metacarpal bone. 1. The tendinous expansion of the knee continued down with the bone. 2. The articulation of the radius, with the first row of the carpus; it is shewn covered with the tendinous expansion which is removed at the edge. 3, 4. The canon. 5. The tibia. 6. The vein that furnishes the foot. 7. The ligaments of the pastern; × The axillary glands. 9. The expansion of the bifurcating ligaments. 10. The situation in which splents are frequently formed. 11. The situation of windgalls, originating from a dilatation of the mucous capsules of these parts.

It may be observed, that, in the first figure, half the hoof has been removed, to shew the laminated substance of the foot; and in the second figure, the horny and fleshy soles have been removed, to shew the insertion of the flexor tendon: it should be remarked, also, that the lateral cartilage has been taken off with the hoof.

DESCRIPTION OF THE ANTERIOR EXTREMITIES.

In the myology of the trunk I followed Bourgelat's nomenclature, as being the most correct extant: had I been perfectly aware of the one used at the Veterinary College, I would have introduced that in preference to any other; from my wish to simplify the art as much as possible, and being anxious to throw no obstruction in the way of the college pupil by multiplying his references: but as I am not in possession of the nomenclature adopted there, I have, for reasons stated in the Myology, used a nomenclature for the muscles of the extremities formed by myself, as nearly corresponding with that in use in the human subject as the circumstances will admit of.

Muscles of the Shoulder.

Trapezius.—According to Mr. Stubbs' description, this is an immense muscle; but though the division of it appears sufficiently definite, yet, by some mistake, he has blended it with part of the common muscle, or levator humeri, and with the cutaneous also. It arises posteriorly from several of the spinous processes of the dorsal vertebræ, and blends with the panniculus carnosus, and latissimus dorsi: anteriorly it arises from the ligamentum colli, or cervical ligament, and then runs down in an angular form to be inserted tendinous into the prominent part of the spine of the scapula (*vid. pl.* 6, *fig.* 1, *a*). This muscle is very useful in drawing the scapula upwards and backwards; and, therefore, must be a powerful assistant in progression: it appears to form the triangular of La Fosse, and the cutaneous of Bourgelat. In the horse, there exists only what is called in man its ascending portion; and it is from a too close straining of the analogy, and a want of sufficient independency in the Hippopotamist, that so much confusion has arisen in the description of this and other muscles.

Rhomboideus major.—This muscle arises, and continues fleshy, from the 3d, 4th, 5th, and 6th spinous processes of the dorsal vertebræ, and is inserted into the internal surface of the cartilage, at the base of the scapula, through its whole extent. (*Vid. l, fig.* 2, *pl.* 6.) It evidently draws the shoulder upwards, and attaches it to the chest. It is the releveur propre of *Bourgelat.*

Rhomboideus minor.—The little rhomboid arises under the cervical ligament, to which it is attached nearly its whole length, and is inserted into the anterior edge of the cartilage at the base of the scapula, rather internally. It is so blended with the former, as to make its insertion with difficulty separable; which has occasioned it to be described as a biceps muscle. (*Vid. q, fig.* 1, *and o, fig.* 2, *pl.* 6.) It has been also called the levator scapuli; as when the neck is fixed, it must tend to elevate and draw the superior part of the scapulary base forward.—*Pectoralis minor, vel depressor scapuli,* is a long fleshy muscle immediately in front of the scapula, arising from the lateral part of the sternum, under the origin of the sterno brachialis, and inserted into the anterior superior part of the scapula. (*Vid. h, fig.* 1, *p, fig.* 2, *pl.* 6). Its use is to depress this bone.

Triangularis.—This muscle Bourgelat considers as part of the serratus major; and it is so connected with it, as to be perhaps as properly so considered, as a distinct muscle: nevertheless, as there is something like a line of division between them, I have chosen this mode. It arises from the transverse processes of the third, fourth, and fifth cervical vertebræ, and inserts itself above the little pectoral, at the superior and anterior edge of the blade bone. (*Vid. m, fig.* 1, *pl.* 6). It draws this bone forwards.

Serratus major anticus, or grand dentata, is a very extensive and important muscle, and arises by fleshy digitations from all the true ribs, covering all that part of the thorax comprehended in this space, and interlacing with the digitated portions of the obliquus abdominis. It unites very intimately with the intercostals likewise, and is continued forward on the neck as far as the transverse process of the fifth cervical vertebra, uniting with the triangular. All this extensive expansion is determined towards the under surface of the scapula like radii to a centre, or like the sticks of a fan, and is inserted into the whole of the upper and internal surface of that bone, below the great rhomboid; one small slip being particularly inserted into the posterior edge of the cartilage. Intermixed with its muscular fibres are some strong tendinous portions towards its insertion, and which Bourgelat mistook for ligaments peculiar to the articulation of the scapula with the chest. It is, however, principally by means of this muscle, that the shoulder is attached to the chest; and while other bones are kept in their situation, by opposition of bone to bone with appropriate ligaments, the scapula has only muscular attachment; hence the extensive origin and insertion of this muscle. When the whole of the serratus is in action, it must tend strongly to draw the shoulder blade to the chest, and in some measure to pull it downward, and hence to elevate the body upon the leg as upon a pillar; therefore, it is the great sustaining muscle of the fore-part of the machine, supporting that weight before which the pelvis does behind. It is likewise a very powerful assistant muscle in inspiration, by enlarging the chest when the extremities are the fixed point; and which appears to be the reason why, in inflammation of the lungs, a horse seldom lies down; because the fore extremities being fixed, the chest can be more enlarged by this muscle: and hence likewise in exercise, when this muscle is wanted for progression, with other assistant muscles, a difficulty of breathing is experienced, and it is done quickly, to make up by frequency what is wanted in strength. (*Vid. kk, fig.* 1 *and* 2, *pl.* 6.)

Muscles of the Humerus, or Arm.

The *antea spinatus* here, is the supra spinatus of the human, and occupies the whole antea spinatus fossa of the scapula; as it proceeds it becomes thicker, and towards its insertion it bifurcates into two portions, admitting the tendon of the flexor cubiti between them. These two tendons are inserted into the two anterior tuberosities of the humerus. From this division, La Fosse has been induced to describe it as two distinct muscles (*vid. f, fig.* 1, *pl.* 6): it powerfully extends the arm, and carries it forward.—*Postea spinatus major*, which is the infra spinatus of the human, has been described as a biceps muscle. It fills up nearly the whole of the postea spinatus fossa; arising thin, but becoming thicker, it is inserted into the lateral external and superior head of the humerus, by which it can draw the arm bone outward and upward. (*Vid. e, fig.* 1, *pl.* 6.)—*Postea spinatus minor* is a small muscle immediately under and behind the former, arising from the posterior part of the scapula, near where the spine ends, and is inserted into the upper small tuberosity of the humerus. In its action it assists the former. (*Vid. g, fig.* 1, *pl.* 6.)—*Extensor ligamenti vel capsularis* is a small muscle, apparently distinct from the former, arising from the coracoid process, and inserted over the capsular ligament; by its action preventing it from being pinched.

Latissimus dorsi is a large thin muscle arising by aponeurosis, from all the dorsal muscles almost to the ilium, and from the spinous processes of the dorsal and lumbar vertebræ: becoming muscular, it is continued over the ribs, intimately connected with the panniculus carnosus, as well as with the trapezius. It then contracts, and being continued downwards under the scapula, it is inserted into the internal superior tuberosity of the humerus, either connected with, or giving a tendinous expansion to unite with the fascia of the muscles of the radius. It draws the humerus obliquely backwards, and assists the trapezius in elevating the scapula. (*Vid. g, fig.* 2, *pl.* 6.)

The *common muscle*, or levator humeri, is one common to the head, neck, and arm, and is variously described in almost every author: by some being confounded with the cutaneous muscle of the neck, and by others with other muscles. Mr. Stubbs calls it latissimus colli; Bourgelat and La Fosse confound it with the expansion proper to this part, with which it is in fact so intermixed, that it is not easy to describe the separate divisions and characters. It is a muscle peculiar to quadrupeds. One origin is from the mastoid process of the occipital bone, and partly also from the temporal bone, which proceeds towards the inferior and anterior part of the scapula; another head arises from the cervical ligament, and some of the posterior transverse cervical processes: these heads passing down under the cutaneous muscle, the first attached to the anterior cervical process, and the second to the latter of them, unite, and are then inserted into the middle and anterior part of the os humeri. (*Vid. p, fig.* 1, *pl.* 6.) In the plate, the cutaneous muscle is seen to adhere with the common; and, in fact, authors are so much divided about these two muscles, that none have yet agreed on the portions belonging to each. It appears that the muscle which is described by them as the cutaneous, is but a portion only of this common muscle which arises from the cervical ligament, and, in fact, I have made the same division; for my cutaneous muscle, described in the Myology of the neck, appears but a portion of this; but as this thin expansion can influence and corrugate the skin of the neck, perhaps it might be not altogether improper to consider that part of it as cutaneous, which, arising from the cervical ligament, lies over the whole muscles of the neck, meets its fellow before the trachea, and is connected by aponeurosis to the spine of the scapula, extending down to unite in the insertion pointed out. From the sterno brachialis being united to a portion of this muscle, Bourgelat has been led to consider the former as a part only of the latter. (*Vid. p, b, fig.* 1, *pl.* 6.) Its use is to elevate the arm, and, when the extremity is fixed, it becomes a muscle of the head and neck, and bends them laterally.

Subscapularis.—It fills up all the subscapulary hollow not occupied by the serratus and rhomboid muscles, but it does not extend quite to the anterior portion of the shoulder blade, which part is occupied by the antea spinatus (*vid. h, fig.* 2, *pl.* 6). It is inserted into the inner head of the os humeri, depressing the scapula, slightly adducting and rotating the humerus; it also strengthens the articulation, and prevents the capsular ligament from being pinched. (*Vid. a, fig.* 2, *pl.* 6.)—*Adductor humeri*, is a muscle arising from the posterior and superior edge of the scapula, attached to the former, but sufficiently distinct to merit a particular name: it is the teres major of the human, and is inserted internally into the humerus some way below its head. (*Vid. n, fig.* 2, *pl.* 6.) It depresses the shoulder, rotates the humerus, and draws it backwards.—*Flexor brachialis anticus* arises from the lower part of the scapula near the articulation, and is inserted into the humerus at its upper and outer part, so as to flex and rotate it in action.—*Pectoralis magnus* arises from the posterior half of the sternum, and from the cartilages of the six last true ribs; is connected with the panniculus carnosus, and the aponeurosis of the obliquus; and is inserted into the head of the humerus internally, and slightly into the outer and anterior part of the apex of the scapula. It draws the humerus downwards and backwards. It appears as cut off in the plate, but its insertion is marked by the letter *g*, *pl.* 6.

Sterno brachialis, I have so named, on account of its situation. Bourgelat considers it, improperly, as part of the common muscle. It is divided into two portions, which arise from the anterior part of the sternum, and are continued over the humerus; one, to be inserted into the lower and inner part of that bone, and the other, by an expansion over the muscles of the radius: both must powerfully adduct the arm. It is removed in *fig.* 2, *pl.* 6, but its insertion is likewise marked (*vid. r*).—*Coraco brachialis* is the omo brachialis of Bourgelat; arising from the coracoid process of the scapula, and is inserted, not into the middle of the humerus, as he describes, but towards the lower head anteriorly. (*Vid. n, fig.* 2, *pl.* 6.) It draws the humerus upwards and inwards, and must prove an adductor.—*Abductor longus humeri* forms the human teres minor, arising near the teres major, towards the superior part of the posterior costa of the scapula: passing along the hinder edge of the next muscle, it is inserted into the external tuberosity, at the upper part of the humerus. (*Vid. c, fig.* 1, *pl.* 6.) It rolls that bone outwards, draws it from the chest, and elevates it.—*Abductor brevis humeri.* This muscle arises from the posterior edge of the scapula below the preceding, and is inserted between that and the subscapularis muscle: it assists the former in its abduction of the arm.

Muscles of the Fore-arm.

Flexor radialis anticus arises tendinous from the coracoid process of the scapula, and runs between the divided portions of the antea spinatus muscle: as it passes over the articulation of the scapula with the arm, it widens and hardens into a substance that represents a patella, and becomes of the same use to this joint that the patella is of to the stifle; this enlarged part is also invested with a particular ligament, and contains synovia: the tendon is then continued between the two anterior eminences of the humerus, from whence it becomes fleshy, having a central line of division, and a strong tendinous or fascial covering, and is finally inserted into the anterior and superior part of the head of the radius, towards the inner side, with the brachialis obliquus. (*Vid. b, fig.* 2, *pl.* 6.) This forms the principal flexor of the fore-arm; and it appears probable, that a dislocation of this tendon, from a violent blow of the shoulder, or arm at its point, forms what is termed a dislocated shoulder, or shoulder slip; for a real dislocation of the humerus from the scapula seldom if ever happens.

Brachialis obliquus, by Bourgelat, is called the short flexor, as the foregoing muscle is by him termed the long flexor; but as, when deprived of its obliquity, it would be the longest of the two, it is evident this term is a very improper one. It arises from around the humerus immediately below its head; passes obliquely over the body of the bone, through the extensor intermedii, or rather through an interval left by its attachment, and is inserted into the superior part of the radius rather internally with the preceding. It is a flexor muscle, and can produce a small degree of lateral motion. (*Vid. o, o, fig.* 2, *pl.* 6.)—*Fascialis cubiti* is the muscle which Bourgelat calls the long extensor. It rises very thin by an aponeurotic expansion from the posterior costa of the scapula, attached to the biceps: passing down by a small fleshy belly till it arrives at the inner part of the olecranon, its fibres expand into some breadth, when the fleshy part inserts itself on the inner side of the olecranon, but the aponeurosis is continued over the fascia of the inside of the fore-arm: its principal use appears to be to keep this fascia tense, not only that it might prevent it from being pinched, but that it might strengthen the muscles in their action. (*Vid. l, fig.* 1, and *f, fig.* 2, *pl.* 6.)

Biceps extensor cubiti is a very powerful muscle, and forms the large extensor of Bourgelat, arising by two portions from the posterior edge of the scapula, forming a large fleshy mass, which fills up the angle between the bladebone and olecranon, and inserting itself into the outer and upper part of the latter of these bones. (*Vid. n, fig.* 1, and *e, fig.* 2, *pl.* 6.) It is a very powerful extensor of the fore-arm.—*Extensor cubiti intermedii*. What I have so named, Bourgelat has called the short extensor, and which arises from the outer head, neck, and some part of the body of the humerus, proceeds down the outer edge, leaving an interval where the brachialis obliquus passes over the bone; it then continues attached to the bone, and inserts itself into the lateral and outer part of the olecranon: that portion of it which occupies the inferior and posterior part of the humerus, and the cavity for the reception of the olecranon, has been described as the little extensor of Bourgelat, but it appears not to deserve any particular division.—*Brachialis internus* forms the *moyen extenseur* of Bourgelat, and arises from below the head of the humerus internally: in the human it arises from the external condyle of this bone, and is inserted into the internal surface of the olecranon. It strengthens the elbow, extends the fore-arm, and is an antagonist to the oblique brachial. (*Vid. d, fig.* 2, *pl.* 6.)

Muscles of the Canon.

Extensor metacarpi magnum forms the right anterior extensor of Bourgelat, and arises fleshy from the tuberosity and external head of the humerus, and from the body of the bone for half its length; its fibres are directed into an anterior tendon which takes them in, in a half pennated form: this tendon being formed towards the lower part of the radius, it here passes through a groove under the tendon of the next muscle to be inserted into the anterior and superior part of the head of the canon or large metacarpal bone. (*Vid. a, fig.* 1, *pl.* 7.) This muscle straightens the knee and extends the canon.

Extensor metacarpi radialis is the oblique extensor of Bourgelat, arising from the lateral part of the radius externally; its fibres pass over the bone anteriorly, and contract into a tendon which proceeds over that of the former muscle, and inserts itself into the inner head of the canon, and into the head of the small internal metacarpal bone. (*Vid. e, fig.* 1, *pl.* 6.) This muscle assists in the extension of the metacarpus; but its principal use is exerted upon the ligaments of the knee, which it keeps firm, and from being pinched.

Flexor metacarpi externus.—The flexor muscles of the extremities of the horse, it may be remarked, are more complex than the extensors. The muscle in question arises from the posterior part of the external condyle of the humerus, and is inserted in part into the pisiform bone, from whence it has been named pisiformis externus. The remainder is continued onwards to be inserted into the external small metacarpal bone, and into the ligaments surrounding these parts; and it must be remarked, that these ligaments are so very complex and numerous, and the metacarpal muscles, as well flexors as extensors, are so blended with them, that it is hardly possible to give any of them a determinate insertion. This muscle can act very strongly as a flexor by its advantageous attachment to the pisiform bone, being thereby removed far from the centre of motion. Also, by a very peculiar connexion it has with the extending anterior ligaments of the pastern, it appears to be so continued into these as apparently to become both a flexor and an extensor (*vid. s, fig.* 1, *pl.* 7); but it will be found, on examination, that by the tightness with which it is bound down to its insertions, it cannot act very strongly on these ligaments, and the action it has, is really favourable to flexion; for it pulls the tendons influencing these ligaments out of the line of their insertion, and consequently must weaken their action, by which it proves an antagonist to them. (*Vid. g, h, fig.* 1, *pl.* 7.) This muscle has been described by the name of extensor parvus, I suppose from this peculiar attachment to the extending ligaments; but from the reasons before given, I think it ought to be considered as a flexor. By Bourgelat, it is the external extensor.

Flexor metacarpi internus arises from the posterior part of the internal condyle of the humerus, and is a long thin fleshy muscle, which passes down under an annular ligament peculiar to it, and is inserted into the posterior portion of the inner head of the canon. It is a flexor to the metacarpus (*vid. a, fig.* 2, *pl.* 7), and forms the internal flexor of Bourgelat.—*Flexor carpi.* I at first proposed calling this Flexor metacarpi medii; but as I could not trace it in any instance farther than the carpus, I considered the former as the most proper: by Bourgelat it is called the oblique flexor. It arises near the former, and, passing obliquely across the muscles at the posterior part of the radius, it inserts itself into the pisiform bone, and hence must prove a forcible flexor to the knee. (*Vid. b, c, fig.* 2, *pl.* 7.)

The *interossii muscles* are not always present, but, when they are, they usually arise by two small fleshy bodies in the groove formed by the canon and the two small metacarpal bones, or a little below the suspensory bifurcating ligament, and run down two or three inches, to be inserted by a joint tendon into the internal side of the flexor muscles of the foot. In one subject that I examined, they existed before and not behind; in others, I sometimes found them both before and behind; and in some not at all.

Muscles of the Pastern and Foot.

Extensor longus pedis anticus.—This forms the anterior extensor of Bourgelat, and the extensor digitorum communis of Stubbs, from its resemblance to that muscle in man; and arises fleshy, in part from the external and lower head of the humerus, and in part from the external and superior portion of the radius, passing over the extensor metacarpi radialis, and being semipennated like the extensor metacarpi magnum. Towards the lower part of the fore-arm it becomes wholly tendinous, proceeding down in front in a firm cord to the knee, where it is received under an annular ligament, which firmly binds it between two prominences in the carpus. As it passes over this joint its tendon flattens and expands (see *fig.* 1, *pl.* 7), and becomes very smooth, by which wise contrivance the effects of friction are prevented. As it runs under the annular ligament of the knee, it detaches in a very peculiar manner a small tendon which unites with the outer slip of the anterior ligaments by an expansion of cellular substance. At the pastern joint, the same enlargement of its surface takes place; at the inferior part of which it receives the lateral expansions of the suspensory ligaments (*vid. fig.* 1), connecting itself very firmly with the lower head of the great pastern, and the upper head of the small; it is finally inserted into the anterior eminence of the coffin bone, to the joint of which, and to that of the pastern, it anteriorly performs the office of a capsular ligament; for on raising it from these parts, the cavity of the joint is always exposed. (*Vid. c, d, fig.* 1, *pl.* 7.) This muscle is an antagonist to the flexors, and acts on the knee, canon, pastern, and foot; straightening all these parts, when the flexors have elevated the limb.

Extensor lateralis pedis is both a muscle of the pastern and foot; but appears rather more appropriate to the pastern, and arises from the outer head of the radius: it soon becomes tendinous, and passes down through an annular ligament on the anterior and rather external part of the knee; from whence it passes obliquely backward to unite itself with the lateral slip of the anterior ligaments, with which it is continued, and with them is inserted into the pastern, sending an expansion which passes on to the ligaments of the foot. (*Vid. r, f, t, fig.* 1.) This small peculiar muscle is an assistant extensor.

Flexor pedis perforatus anticus.—The perforatus and perforans have been considered and described as one muscle with several heads; but though some few of their fibres intermix, yet they are evidently distinct muscles. The perforatus arises from the posterior and lower part of the internal condyle of the humerus, between the heads of the next muscle, and descends along with these heads, with some of which it blends its muscular fibres, and becoming tendinous at the same part with them, it enters the ligamentous arch formed between the pisiform bone and neighbouring parts. It here first spreads to encase the united tendons of the perforans; but at this part the encased and encasing tendons are not united by cellular substance, but are very smooth; and though one lies within the other, lubricating mucus is always interposed between. Within this arch, these tendons are firmly bound down between the heads of the small metacarpal bones, by ligamentous fibres; and between them and the surface they pass over in this arch, a true cavity exists, which contains synovia; so that cutting the tendon through here would have all the effect of opening a joint. By its being so firmly and closely connected to the bones, its strong contractions are prevented from rupturing or lacerating the surrounding parts. As this tendon passes below the knee encasing the perforans tendon, it receives a peculiar ligamentous substance which arises near the origin of the elastic bifurcating ligament, and which substance divides, one portion inserting itself into one side of this tendon, and the other portion into the other; by which means both tendons are more firmly connected to the bones, and kept in their proper line of action: they are likewise considerably supported by this means. (*Vid. s, fig.* 2.) The perforatus tendon now passing down, encasing the other at its posterior part, and united to it by a cellular substance, near the fetlock, first enlarges, and, when opposite the sessamoids, it becomes a complete ring. (*Vid. t, fig.* 2, *pl.* 7.) This exhibits a most wise provision; for as this is a most prominent part, purposely made so by Nature, to throw the tendons farther from the centre of motion, which are here peculiarly exposed to accident; so without this admirable contrivance these tendons might become dislocated from each other. The joint tendons are held in this situation by an expansion of the suspensory ligaments (*vid.* 10, *fig.* 1, 9, *fig.* 2, *pl.* 7) and by ligamentous fibres from the integuments, which over this part are very thick: inferiorly they are secured by an expansion of the ligaments of the pastern (*vid.* 9, *fig.* 1 *and* 7, *fig.* 2, *pl.* 7): so at this part the perforans is inclosed with a double theca. The perforatus tendon now passing towards the heels, bifurcates into two portions (*vid. p, fig.* 1, *u, fig.* 2, *pl.* 7), which are inserted into the large and small pastern bones, and blend with the ligaments from these parts.

Flexor pedis peforans anticus.—Though some of the fibres of this blend with the last described, yet it is evidently of itself a muscle; and arises by two heads distinct, and two heads less distinct; one of which originates from the posterior part of the ulna (*vid. g, fig.* 2, *pl.* 7); two others, in some measure blended together (*vid. e, f, fig.* 2), arise from the internal and posterior inferior portion of the humerus; and a fourth still more indistinct, appearing like a collection of fibres belonging to one of the former, arises under these, rather posteriorly. These portions pass down fleshy to near the knee, where the most central receives a peculiar ligament from the inner edge of the tibia (*vid. r, fig.* 2), the use of which must be to bind it more closely down in its action. As these heads enter the arch formed by the ligaments extending from the pisiform bone, they unite to form one strong tendon, which is received into the perforatus tendon; but which does not wholly surround it, but embraces all its posterior part (*vid. l, fig.* 1, *v, fig.* 2): in the human the perforatus forms a division merely to let the perforans tendons through. As the perforans tendon passes the ligamentary arch behind the knee, it is firmly bound down to the bones as we have shewn, by which it not only operates in the flexion of this part, but its strong action is also prevented from lacerating any of the surrounding substances: at this part synovia is found interposed between the perforatus tendon and its own, and likewise between this and the pisiform bone, by which means motion is assisted, and the effects of friction prevented; but between the other parts of this and the perforatus tendon, except at the ring of the fetlock, there is merely connecting cellular membrane. Proceeding from under the arch of the knee, and down the canon, invested at its posterior part in the way we have mentioned, it passes between the divided portions of the ligament described with the last muscle, and, continuing down the remainder of the canon, at the fetlock it is found entirely surrounded by the perforatus, which at this part becomes perfectly annular, as before noticed, to prevent the possibility of a dislocation between the two tendons at this exposed part. (*Vid.* 10, *fig.* 1, *t, g, fig.* 2.) At the heels the perforatus leaves the perforans, and is now continued alone, to be inserted in an expanded portion in the posterior part of the vaulted arch of the coffin bone. (*Vid. fig.* 2, *pl.* 7, and *f, f, fig.* 1, *pl.* 9.) These muscles, it is evident, are most important, and operate the flexions of the knee, pasterns, and foot.

Ligaments of the Anterior Extremities.

The bones of these parts have been before particularly described in the Osteology; and the ligaments immediately connecting them, have been treated of likewise; but there are others connected with the muscles and integuments of these parts we have yet to describe. The muscles of the arm and fore-arm are covered by a *tendinous theca*, which forms a sheath to each of them individually, and is likewise reflected over the whole of them generally; so that on removing the integuments one plain surface is seen, and the risings and depressions of the muscles are by this means hardly visible. Nature has also wisely formed the integuments, or skin of the extremities, very strong and dense, particularly over the joints, forming a guard to them: this skin is thicker at the posterior part of the leg than at the anterior, and is much more firmly attached to some parts than to others. It adheres not only by the general cellular membrane, but is strengthened by ligamentous fibres which pass between it and the parts it covers: but these do not exist generally over the whole surface, but in particular parts only, as the fetlocks, and the lower and posterior portions of the limb.

Over all the extremity also, but particularly over the knee, canon, and fetlocks, is spread a very firm dense cellular membrane, which may be raised in layers. It forms a strong investing covering to the whole; some portions of which are found to be loose, and others are attached to the ligaments below; so that it is extremely difficult, in raising it, to ascertain justly what is investing cellular substance, what is fascia, or aponeurotic expansion, and what is appropriate ligament. When the outer and more loose layers of this general membrane have been removed, there appears over the muscles of the arm and fore-arm, a general fascia formed from extensions of the muscles of these parts, which seems either to end in, or unite with, a general ligamentous expansion that covers the whole of the knee, and inferior part of the radius, as well as the superior part of the canon: and is firmly bound down to the outer edge of the radius. (*Vid. z, fig.* 1, *pl.* 7.) It then appears continued around over the back of the knee, and over the pisiform bone, to form the ligamentous arch, existing there for the purpose of binding down the tendons in their action. It is these densely united expansions likewise which form the general annular ligament (*vid.* 3, *f*, *fig.* 1): other reflections of it, and of the immediate portions from one bone to the other, form also the particular annular ligaments, of which almost every tendon has one or more appropriate to it. From the posterior part of the knee, where this general annular ligament is the thickest, it is continued down thus dense and firm rather more than a third of its length (*vid.* 4, *fig.* 1, and 1, *fig* 2), by which it firmly fastens the flexor tendons. It is then carried round the fore part of the canon, closely attached from one small metacarpal to the other, in its passage becoming connected with the anterior ligaments, and thence carried in front down as low as the pastern, though behind it is continued no farther than where we described it; or at least the more tensely stretched portion, for there is a looser part still carried down behind as well as before. In *fig.* 1, at 5, this anterior portion is seen, cut from the inner edge of the extensor longus, where it passed over, to be reflected on the inner metacarpal bone as described, and as may be seen in *fig.* 2, between *x* and *z*.

This ligamentous expansion is wisely not continued lower posteriorly, or it would have impeded the motions of the tendons, by increasing the friction; but anteriorly, it cannot have this effect; on the contrary, thus far it strongly assists the parts. That, if continued lower posteriorly, it would impede the motions, is very evident; for even as it is, when it is bound too closely to the bones, as is sometimes the case, from a want of prominence in the pisiform bone, these tendons then act disadvantageously; and such a horse is popularly said to be *tied in* under the knee. Horses so formed are always found to be easily strained; for they have not only greater resistance from the friction of the part to overcome; but the tendons, by not being so far removed from the centre of motion, require a much greater force to overcome even the common opposition to the flexion of the parts. Besides this general ligament reflected over the knee and metacarpus, there are two *anterior ligaments of the canon*, which appear composed of a layer of the general annular ligament, of a particular one sent off from the pisiform bone, and of two tendinous laminæ, one belonging to the lateral extensor, and the other given off from the long extensor. (*Vid. s*, *u*, *fig.* 1, *pl.* 7.) These ligaments are an outer and an inner, but run down nearly together, obliquely from the outer side of the knee, to the anterior part of the canon, and insert themselves into the pastern, having an expansion continued on to the lesser pastern and foot. (*Vid. t*, *v*, *fig.* 1.) The tendons assisting to form these do not so closely unite with the ligaments, but that the distinct portions may be traced down all the way; nor do these ligaments unite with each other, but are continued separate with an intermediate portion of the general investing cellular substance between them.

At the posterior part of the canon, are two very peculiar ligamentous portions, which have usually been called the lateral; but they would be more properly termed *elastic bifurcating ligaments* or *suspensory*. They are placed in the hollow formed at the posterior part of the large metacarpal bone, or canon, by means of the two small metacarpals (*vid.* 7, *fig.* 1, *x*, *fig.* 2), and originate near the head of this groove; that is, near the superior head of the canon, to which they are firmly attached, as well as to the small metacarpal bones. From this, they are then continued within the groove, but unattached to the bones, down the canon, where they appear, on close examination, to be divided into two portions, by a hollow on their inner part, which bisects them, and in which hollow sometimes a blood vessel runs down to the pastern. These ligaments have the peculiarity of being elastic, and, except the cervical, there are but few instances of ligamentary elasticity in the body. As they approach the pastern, they bifurcate into two portions (*vid. x*, *fig.* 2): these branches are inserted into the sessamoids, and give each a continuation of their substance, expanded and passing obliquely over the body of the pastern, to unite with the tendon of the extensor longus in a more connected form. (*Vid.* 8, *fig.* 1, *y*, *fig.* 2, *pl.* 7.) They likewise give off a posterior expansion which surrounds the perforatus tendon, and fixes it in its situation. (*vid.* 10, *fig.* 1, 9, *fig.* 2, *pl.* 7.)

The *elastic suspensory ligaments* are of the greatest consequence to the extremities; they support the sessamoids in their situation, and by their continuation in front to join the long extensor, bind down this tendon in its action, and support the pastern in its extensive flexions; acting, in conjunction with the sessamoid bones, both as a pulley and a lever. This ligament must evidently be liable to compression from splents, and from the ossification of the junction of the small metacarpals with the large; and though it is not very vascular or sensible, yet the cellular membrane surrounding it is so. It will, therefore, appear evident, why *splents* placed posteriorly, should be more liable to lame a horse than when placed more to the side of the leg. By observing *z*, *fig. 2*, *pl. 7*, which is not far from the usual situation of splent, it will be seen that, when it takes place behind this, it must interfere with the elastic suspensory ligament, and by its rough surface must wound the vascular membrane of the ligament, as well as the ligament itself, which has some sensibility, particularly under inflammation; and, by this means, pain and lameness are very likely to be the consequences.

Besides these, there are two other peculiar ligamentous substances, which are inserted into the flexor tendons, and appear designed to confine them down in their action, and to support them under violent exertion. The superior of these (*vid. r, fig.* 2) arises from the inner edge of the tibia, and is fixed into one of the heads of the perforans muscle, just before its junction with the rest, by which means it acts upon the whole. The other arises inferior to this, from the posterior part of the canon, near the origin of the suspensory ligament, and then branches into two portions to insert itself into the two sides of the perforatus tendon. (*Vid. s, fig.* 2.) By these, the flexors of the foot are not only suspended, and their action increased, but the latter is eminently useful in preventing the perforans tendon slipping from the perforatus above, as the ring of the perforatus does the same below.

The various tendons of the canon and foot have each a *sheath*, or *theca;* between which and the tendon exists a mucus to prevent the effects o friction; and to secrete which, the inner surface of this theca is very vascular. It often happens that this secreting surface becomes inflamed from friction or injury done to the parts, when, instead of mucus, coagulable lymph is thrown out between the sheath and the tendon; hence motion is rendered painful and imperfect, and swelling remains: this is usually termed a *clap*, or *strain in the back sinews;* but sinews or tendons are perfectly inelastic, and it is in some measure doubtful whether a sufficient extension of their substance ever takes place actually to strain; but probably a small distention may rupture their fine vessels, and they may be themselves ruptured, though this is seldom the case; but what is termed a strain in the back sinews, is either the effect of inflammation between the sheath and the tendons from a rupture of their vessels; or, in more violent cases, there is often a laceration of the cellular substance interposed between the one and the other. Sometimes the sheaths themselves are ruptured, in which instances the lameness is excessive, and the limb incapable of sustaining much weight; but yet it is not brought to the ground, although this receives the name of *breaking down*. It is, however, evident, that the term of breaking down ought only to be applied to a rupture of one or both of the tendons themselves, which very seldom occurs; and when it does happen, may be known by the fetlock being actually brought into contact with the ground.

The *vessels and nerves of the extremities* have been fully described in the Angiology and Neurology.

THE POSTERIOR EXTREMITIES, OR HIND LEGS.

Description of Plate VIII.

The Reader is requested to observe, that the muscles of the buttock and superior part of the extremity are to be seen in Plate VI.

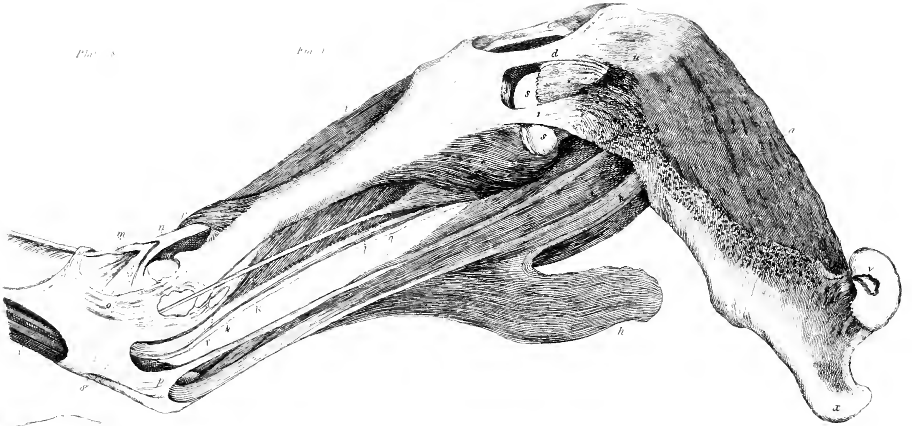
Plate VIII, represents a right and left hinder extremity. In the right extremity, the femur or thigh bone is seen whole, with some of the external muscles removed, and part of the canon taken off. In the left extremity the greater portion of the femur is removed, but the whole of the tarsus and metatarsus is shewn.

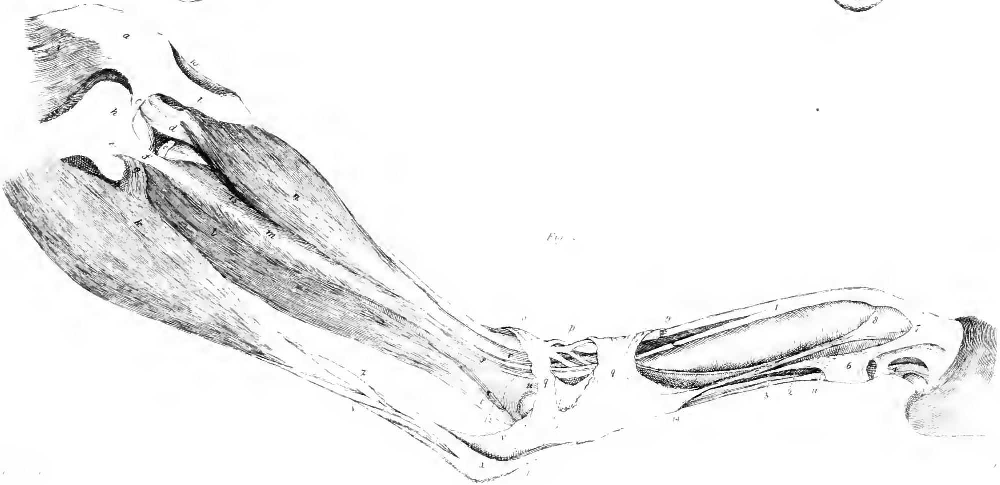
Figure the First.

a, rectus cruris muscle inserting itself into the head of the patella; the line between it and 2 is the division of the cruris from the cruralis: all the rough marks along the femur up to its neck are remains of the vastus internus cut off from its origin at the cervix of the femur; *b*, the insertion of part of the triceps muscle; *c*, a ligament of the patella continued into the outer part of the tuberosity of the tibia; *d*, a ligament from the inferior part of the patella, united with a continuation of the rectus tendon; *e*, the popliteus muscle; *f*, a ligament extended from the outer side of the tibia, forming part of the general ligament of the hock and canon; *g*, the plantaris muscle; *h*, *h*, the two heads of the gastrocnemius muscle; one is cut off to shew the parts beneath; *i*, the perforated muscle; *k*, the perforating muscle; its oblique fibres are seen running into its tendon, immediately below which is the popliteal nerve of the leg passing with it; *l*, the assistant flexor of the foot; *m*, the invested bifurcating tendon of the flexor of the canon; *n*, the investing tendons of the same muscle; *o*, the general outer annular ligament of the hock; *p*, the fascial ligaments formed from the fascia of the perforatus muscle; *q*, the continuation of the general aponeurotic ligamentous expansion attached to the small metacarpal bones; *r*, an articulatory cartilage interposed between the end of the tibia and the flexor of the canon; *s*, *s*, the inner condyle of the femur, articulating with the tibia, and resting on the articulatory semilunar cartilage; *t*, part of the tibialis anticus, or extensor of the canon; *u*, the patella connected to the thigh by the insertion of the muscles of the leg, and by its ligaments; *v*, the head of the femur, with the cavity, in which is contained the ligament connecting it with the acetabulum; below is seen the rough edge of the capsular ligament cut off; *x*, the great trochanter; *y*, the tendons of the perforating muscle; *z*, the tendons of the greater and lesser flexors of the foot; 1, is a ligament from the femur to the head of the tibia, formed in part from a continuation of the triceps muscle; 2, part of the cruralis muscle; 3, semilunar cartilage; 8, the usual situation of windgalls on the hock.

Figure the Second.

a, the patella connected to the thigh, by the insertion of the rectus muscle superiorly, and of the vastus externus muscle at *i*; and below by its ligaments; *b*, a ligament from its outer side to the head of the tibia, united with a portion of the tendon of the vastus externus; *c*, a lateral ligament of the patella; *d*, the tendon of the tibialis anticus arising from the front of the condyle of the femur, forming an attachment of the femur with the tibia; *e*, part of the semilunar cartilages attached to the tibia by a ligament; *f*, the tendon of the lateral flexor of the foot, forming likewise an attachment from the femur to the fibula; *g*, the insertion of the popliteus muscle; *h*, the outer condyle of the femur; *i*, part of the vastus internus; *k*, the gastrocnemius muscle; its tendons are seen running down twisted within the fascial ligaments; *l*, the perforans muscle; its tendon is seen passing down at *t*; *m*, the lateral extensor; *n*, extensor longus; its tendon is seen at *r*, and between it and *s*, is seen the artery of the leg passing down; *o*, the investing part of the tibialis anticus; *p*, the invested bifurcating part of this tendon; *q q*, the general annular ligaments of the hock, formed from the expansion continued from the edges of the tibia, and carried downwards around the canon, leaving the posterior parts of it at 14, but continued in front over the tendons of the flexors of the foot, and the ligaments united with them, from the sides of which it is reflected on to the small metacarpal bones: in the plate it is cut off to shew the parts beneath; its cut edges are seen adhering to the metacarpal bones: the portion between *q q*, which is thinner than these peculiar





bands, is removed to shew the part underneath; *r*, the tendon of the extensor of the foot; *s*, the tendon of the lateral extensor; *t*, the tendon of the flexor of the foot; *u*, the inferior head of the tibia articulating with *v*, the os calcis; immediately below it, is seen some lines which describe the posterior ligament of the hock, which is usually the seat of curb; *x*, the fascial ligaments, formed from the fascia of the perforated muscles; *y*, the twisted tendons of the gastrocnemii; *z*, plantaris muscle; 1, the union of the tendons of the extensor of the foot; 2, the elastic bifurcating suspensory ligaments continued on to unite with the extensor of the foot, and giving an expansion to bind the flexor tendons down; 3, the metacarpal bones within their ligaments, continued on to the ligament of the pastern; 4, the perforated muscle going to its insertion; 5, the perforating muscle entering the foot; 6, the expansion of the bifurcating ligaments; 7, the union of the bifurcating ligaments and tendons of the flexor muscle; 8, the ligament of the pastern formed from its own proper ligament, and a continuation of the ligaments from the small metacarpal bones; 9, the little extensor muscle; at this part is likewise seen the sheaths of the tendons of the flexor muscles; 10, the anterior ligament of the patella; 11, the bursa mucosa that surrounds the tendons of the flexors of the foot, and that in its dilatation forms windgalls in the pasterns; 12, an articulating cartilage between the tibia and flexor tendons; 13, the bursæ mucosa of these tendons, which form the windgalls of the outer side of the hock; 14, is the part where the ligamentous expansion terminates posteriorly.

DESCRIPTION OF THE POSTERIOR EXTREMITIES.

On removing the skin from the loins, croup, thigh, and leg, the muscles of these parts are so covered with a strong firm expansion, called *fascia*, as to be indistinct till it is removed. This fascia is intermixed with fat and cuticular nerves, and does not appear to be produced by any particular muscle alone, but arises conjointly from all the muscles of the posterior extremity; principally, however, from those situated on the loins and buttock, and is found particularly strong and firm on the outer side of the thigh and leg, so as greatly to strengthen the muscles in their action. This peculiar ligamentous expansion is acutely sensible under inflammation; and I am disposed to attribute to an inflammation in this, that distressing sensation frequently felt by a horse in blistered legs, grease, or other open sores behind; in which instances the animal is observed, after he has been suffered to remain quiet a little time, when he next moves, to draw his leg up to his body in a convulsive and distressing manner; sometimes to such a degree as nearly to throw himself to the ground.

The integuments of the hinder extremities, like those before, will be found to be naturally much thickened, particularly over exposed parts: they are remarkably so over the hock, and down the canon likewise; and as the hinder part, where the back sinews are situated, is much exposed, so they are there peculiarly thick and strong. At the coronet the thickness is also considerable; and in many parts of the hinder legs, as in those before, the skin appears attached by peculiar ligamentous fibres; so that in dissecting the integuments, it is often difficult to remove them in such a manner as to be exactly able to ascertain what is the appropriate ligament to the parts remaining, and what only rendered the adherence more intimate between the integuments and muscles. As soon as the skin is removed, the external layer of fascia then appears, and upon which two considerable veins are observed to pass superficially: sometimes there appear more than this number; generally, however, one runs on the inside of the hock, and is that which, when varicosed, forms blood spavin; the other is situated in the hollow formed between the tendo Achilles and the flexor muscles. Like the fore extremities, the upper parts of the hinder limb appear covered with a true fascia, or tendinous expansion; but the lower have this expansion formed of apparent layers of cellular and ligamentary substance; one is dense, firm, and inelastic; the other is dense, firm, and very elastic: the fascia itself is also composed of several layers, some of which surround only one muscle; some a set of muscles of the same action; and some form a general investment of the whole; yet all of these intermix. The fascia that covers the inside of the thigh is not so dense as that on the outside.

Muscles situated on the Pelvis and Thigh, belonging to either the Thigh or Leg.

In the division of these muscles it will be seen I have, as in those of the fore extremities, differed from all former authorities; but in this I was not stimulated by any love of novelty, nor by any presumption in supposing my own mode unobjectionable; but because I was not aware of any division known to me that did not appear to describe these parts very imperfectly.

Tensor vaginæ femoris.—This muscle is called, by Stubbs, musculus fascia lata, and arises from the anterior angle of the ilium; connected posteriorly with the external glutei, it runs into the flank, thus appearing, at the lateral external part of the thigh, a thin fleshy expansion, which soon degenerates into an aponeurosis, uniting in some degree with that from the other muscles, to cover the external part of the thigh very strongly, as well as part of the leg: being continued over a portion of the inner side of the thigh immediately under the fascia expanded from the panniculus carnosus, it inserts itself into the patella, as well as into the head and lateral part of the tibia. (*Vid. g, fig.* 3, *pl.* 6.) This muscle tends to bend and abduct the thigh; it likewise, by stretching the vaginal fascia, increases the general strength of the muscles, and, as such, this name is a more proper one than that of fascia lata.

Gluteus posticus, or *externus,* is the outer of the glutei muscles, and is not, as in the human, the largest: it arises by two portions; an anterior from the anterior angle of the ilium, and a posterior from the posterior angle of the same: between these two heads a semicircle is formed, leaving the gluteus maximus exposed; at least it is only covered by a slight expansion of aponeurosis, from which this part of the muscle takes its origin; it then inserts itself at the small external trochanter, by a flat tendon, first giving off along the posterior side of its belly a firm aponeurosis to the muscles within the thigh. (*Vid. fig.* 3, *pl.* 6.) It acts as a flexor and an abductor.—*Gluteus maximus* is not, as in the human, situated the most externally of the glutei muscles, but is placed under the former one. It is a very large muscle, contiguous to, and blended with, what Mr. Stubbs has called the sacro lumbar mass, and fills up almost the whole of the croup, covering the external surface of the ilium and lumbar vertebræ: arising from the spinous processes of these as well as those of the sacrum, and from the anterior and superior spine of the ilium; when, contracting, it becomes interspersed with tendinous layers, and terminates by inserting itself very strongly into the trochanter major. (*Vid. f, fig.* 3, *pl.* 6.) It acts by drawing out the femur, by which it can straighten the limb, and force it outward and backward.——*Gluteus minimus.* This muscle is a small mass immediately under the former muscle, arising from the ilium above the acetabulum, and inserted immediately under the former and into the trochanter. It must assist the foregoing.—*Biceps flexor cruris* arises principally by two heads; the longest of which originates in common with the next described; the other from the tuberosity of the ischium: these two heads form one muscle, which inserts itself in a double manner by a tendon which is fixed into the patella. By the length and mode of these insertions its powers are much increased, and it can act strongly as an abductor and a flexor. (*Vid. b, fig.* 3, *pl.* 6.)—*Flexor cruris posticus* forms what Stubbs calls the semi tendinosus, and is so called in the human subject: by Bourgelat it is named the demimembranosus; but which are both indefinite terms. It arises by two heads, from the ligament of the sacrum and ischium; the tuberosity of the latter, and from some part of the coccygis: descending along the posterior part of the thigh, it inserts itself into the internal surface of the tibia, three inches below its head; it likewise forms an aponeurotic expansion. (*c, c, d, fig.* 3, *pl.* 6.)——*Semimembranosus.*—This muscle is a part of Bourgelat's longus vastus; it arises from the tuberosity of the ischium, and the whole of the inferior angle; and from an aponeurosis connected to some part of the length of the femur; it then passes down in a fan-like form to be expanded into a broad fascia; the anterior portion of which is inserted into the anterior part of the femur and tibia: its posterior covers the posterior muscles of the thigh, leg, and tendo Achilles. (*Vid. a, a, fig.* 3, *pl.* 6.) The whole must powerfully flex the leg, and abduct both thigh and leg.—*Capsularis* is a small fleshy and apparently distinct slip from the glutei muscles, arising from the brim of the acetabulum, passing over attached to the capsular ligament, and inserted into the lateral superior part of the femur. Bourgelat calls this the straight muscle, and describes as its use, that it assists in rotating the thigh: but it appears to me intended to keep the capsular ligament from being pinched between the pelvis and femur.

Muscles on the Inside of the Thigh.

Gracilis.—This has been called biceps adductor, and, by Bourgelat, it is named the short adductor; nor is it hardly thin enough to be named gracilis, as in the human. It has a line of division through it, and is the muscle that first appears on the inner side of the thigh on removing the integuments and fascia; arising from the pubis, and from the ischium, and terminating by an aponeurosis, covering the internal part of the thigh, and more particularly ending in the superior and internal part of the tibia. (*Vid. b, fig.* 4, *pl.* 6.) It is a principal adductor of this part. Bourgelat gives the name of gracilis internus to the muscle which is analogous to the semi tendinosus, and which we have named triceps adductor femoris.—*Sartorius* is so called from its crossing the legs, by which it becomes of great use to tailors; but it is questionable whether *adductor longus* would not be a more proper name for it in the horse. It arises from about the middle of the brim of the pelvis on its inner edge, and passes obliquely across the psoas and iliac muscles to terminate in a small tendon attached with the gracilis to the upper and lateral internal part of the tibia. It flexes and adducts the leg and thigh. (*Vid. h, fig.* 4, *pl.* 6.)—*Psoas parvus* is a muscle proper to the loins, and which is often wanting in the human, but is always present in the horse. (See *Muscles of the Loins, and d, fig.* 4, *pl.* 6.)—*Psoas magnus* arises from the two last false ribs, and last lumbar vertebræ on the outside of the psoas parvus; continues attached to the pelvis in its descent, and is inserted into the internal trochanter. (*Vide e, fig.* 4, *pl.* 6.) It draws the thigh forwards. The disease existing in the cellular membrane of this muscle, called psoas abscess, is not found in the horse; which perhaps strengthens the opinion that this complaint first forms in some of the bones of the spine, and to which affection also the horse is not subject.——*Iliacus internus magnus.*—This muscle arises from the internal surface of the ilium, passes on the outer side of the preceding, and terminates with the former. It rotates the thigh, and bends it inwards. (*Vid. f, fig.* 4, *pl.* 6.)—*Iliacus internus minor* is a muscle not present in the human, arising from the brim of the pelvis, and inserted into the small trochanter, by which it assists the former.—*Pectineus* takes its origin from the pelvis at the os pubis, and is inserted rather below the internal small trochanter. It draws the thigh inwards and upwards. (*Vide c, fig.* 4, *pl.* 6.)—*Triceps adductor femoris* arises by three heads; one from the internal edge of the pubis; another from the interior branch of the ischium; and a third, smaller, from its tuberosity; passing down together, but not intimately united: one is inserted into the posterior part of the femur; another into the superior and internal part of the tibia; the third inserts itself distinctly into the internal tuberosity of the femur. This last portion Bourgelat calls gracilis internus. (*Vid. a, a, fig.* 4, *pl.* 6.) These portions all flex the leg and thigh, and draw it inward. (*Vid. b, fig.* 1, *pl.* 8.)—*Vastus externus* arises broad and fleshy from the root of the trochanter major, and external lateral parts of the femur, and inserts itself into the lateral part of the patella.—*Rectus cruris* arises by two tendons; one from the ilium above the acetabulum; the other from the upper part of the femur: its fibres run in a penniform manner, having a tendinous centre. It is inserted into the upper part of the patella by a very strong tendon, which sends an expansion over this bone, and unites with a powerful ligament (*vid. pl.* 7), extending from its lower part to the head of the tibia: this expansion is united with a similar one of the vastus externus, and which, by this means, sends off from its side a fellow one that connects itself with the tibia laterally. These bands are assisted, both in their strength and formation, by the fascia which covers all the joint and adheres to this part. (*Vid. i, fig.* 4, *pl.* 6.) This muscle acts with the vasti, in straightening the leg by drawing up the patella.— *Vastus internus*, taking its origin from the neck of the femur, and from its whole inner surface; is continued down to be inserted into the inner side of the patella.——*Cruralis*, or *crureus*.—The propriety of the division of this into a distinct muscle admits of a doubt; for it is very much blended with the three former, occupies the lower portion of the femur, and is inserted with the preceding into the patella. It must be evident, that the foregoing muscles are joint extensors of the leg; and when we observe their mode of insertion, we shall be aware they can act with surprising strength, and the power they act with is increased by the patella elevating their tendons from the centre of motion. It likewise affords a smooth surface for these two bones to act upon, and acts itself as a pulley to the muscles, which being short, require an assistant mechanism.—*Obturator externus* arises from the inner crus of the ischium, surrounds the foramen thyroideum; and likewise arises from the ligament covering this oval opening: collecting its fibres, it passes rather around the root of the back part of the neck of the femur; and is inserted by a strong tendon into the cavity at the posterior part of the great trochanter. Though it is a short muscle, yet by its direction, and by multiplying its points of contact, and those advantageously, it can act with considerable strength in rotating the thigh inwards; directly contrary to the action of the same muscle in the human.

Quadratus femoris is a long thin muscle not described by Bourgelat, arising from the lower portion of the ischium, and inserted a little below the great trochanter, by which it rotates the thigh outward.—*Gemini* are two slips arising, one superior to the other, from the ischium and pubis, near their junction; and inserted along with the preceding, to which they, in common with the two next muscles, are antagonists—*Obturator internus* arises within the pelvis from around the foramen thyroideum-—*Pyriformis* arises within the pelvis from the sacrum; both this and the former pass out at the nitch in the ischium with the posterior crural nerve, and are inserted with the gemini, assisting them in their action.

The Muscles of the Canon.

The *popliteus* is a muscle that may be described either as belonging to the leg or canon. Bourgelat chooses the former, and calls it the abductor, describing it erroneously as a very small mass, whereas it will be seen, that it is a very considerable muscle. It appears to me, that, in all the descriptions of it, both in the horse and man, its origin has been mistaken for its insertion: It may properly be described to arise from a ridge on the internal side of the tibia, below its head (*vid. e, fig.* 1, *pl.* 8); with its fleshy fibres running obliquely outwards and upwards, to be inserted by a tendon into the lateral part of the external condyle of the femur (7, *fig.* 2), having in its course adhered firmly to the capsular ligament of the joint. Its use is extensive and various; it strengthens the articulation by approximating the ends of the bones, prevents the effects of concussion, and is no inconsiderable flexor of the canon, turning the hock inwards, and preventing the capsular ligament from being pinched; it also attaches the semilunar cartilages.

Tibialis anticus.—This very curious and complex muscle forms the flexor of the canon of Bourgelat. It is a biceps, having two origins; the first by a very strong tendon (*d, fig.* 2), from a cavity on the anterior part of the external condyle of the femur, which tendon performs the office of a support to the joint, and likewise serves as one of the origins of the flexor of the foot: this tendon, then passing inwardly, is received by the fleshy part which arises from the cavity behind the anterior spine of the tibia for nearly its whole length, and is continued down still in a tendinous form within this fleshy part, and only slightly united with it. Towards the inferior part of the same portion it degenerates into a tendon, which now in turn becomes invested, being surrounded by the tendon of the first origin, and, coming out from that (*vid. m, fig.* 1, *p, fig.* 2), it bifurcates into two branches, one of which is longer, and expands to insert itself on the inner side into the lateral and posterior part of the canon: the other, and shorter, is inserted into the anterior and superior part of the head of the canon. The investing tendon (*vid. n, fig.* 1, *o, fig.* 2) likewise divides into two branches, which attach themselves near those of the former portion, but rather superiorly. By this peculiar mode of insertion of its tendon, it acts with much greater force and advantage, embracing more points of contact, acting upon several points of the hock at the same time, and by these means strongly flexing the canon.

Gastrocnemius (*vid. h h, fig.* 1, *k, fig.* 2) forms what Bourgelat calls the gemini; but which in the horse is only a biceps, and therefore it does not deserve this name as in the human, where they are really a pair of muscles of twin action, origin, and insertion. The origin and termination of this, like the former, are not a little curious, arising by two distinct heads, an inner and outer; the outer from the inferior portion of the femur, at the external part; when descending, it gives off a flat tendon, which, about midway along the tibia, becomes rounded, and passes under the tendon of the internal head. This internal head arises less fleshy (*vid. h, fig.* 1) from the lateral internal part of the femur, just before it expands into its condyles: it soon becomes tendinous, and its tendon stretches over that of the external, both becoming curiously twisted with the plantaris tendon, and united with cellular substance, into a rope with spiral windings (*vid. y, fig.* 2): from this it passes down rather to the outer side of the perforatus tendon, between the ligaments united with it, where the rope inserts itself into the point of the calcis or hock; the tendon of the internal head sending down an expansion to the canon and parts below. This muscle forms the extensor of the hock, and is one of the most important of those concerned in progression. It is by means of this, that the angle of the hock being opened by carrying the hinder extremity forward, as in galloping, leaping, &c., the horse is enabled to throw his body onwards, by again contracting the angle; and hence it is that a wide hock is of such advantage: for the farther this tendon is removed from the centre of motion, so much can it act with the greater force; and hence we see great wisdom in the formation of this muscle, which, by being divided into two portions, presents a greater number of points of contact; and also, by the division and twisting of its tendon, the strength becomes greatly augmented.

Plantaris forms the lateral extensor of Bourgelat, and is a very small thin muscle arising from under the external head of the gemini above the outer condyle of the femur: passing down fleshy and obliquely, it crosses the tendon of the gastrocnemii (*vid. g, fig.* 1, *z, fig.* 2) from within outwards, and inserts itself by a tendon into the point of the hock, in company with the gastrocnemius muscle, sending down an expansion that affixes itself into the inner side of this part. Its use appears doubtful in the horse, for, as an assistant to the flexor muscle, it is too trivial to have had a separate existence. Nature, who ever works with as much simplicity as is consistent with the proper formation of parts, and with the regular economy of the organs, will not make a small and large muscle, when one would be adequate to all the ends of the contraction: but it is more reasonable to suppose, that it acts during progression in keeping distinct some of the muscles and ligaments of these parts.

Flexor pedis perforatus posticus arises near the origin of the gastrocnemius in the cavity behind the condyles of the femur: its fibres uniting, it proceeds from the inner side of the tendon of the gastrocnemii to the outer and posterior part, and then passing down, it receives the expansion of the fascial ligament, at *p, fig.* 1, *x, fig.* 2, and is, by this means, bound more closely to the point of the hock, at which part it is considerably expanded to receive the point of the os calcis into a kind of sac or cap, in which synovia exists: so that here also a wound of this part, sufficiently deep to penetrate the tendon, would have the effect of opening a joint. It then runs down the posterior and inferior part of the hock, and is seen in *fig.* 1 and 2, having the investing fascial ligament cut off* to shew its progress as it proceeds to meet the perforans tendon, which it passes to the outside of, and surrounds its outer portion: continued down, it wholly encircles the perforans tendon at the pastern (*vid. b, fig.* 2), in a similar manner to the perforatus of the anterior extremities, when running through an expansion formed jointly from the elastic suspensory ligaments, and that extended from the small metacarpal bones, it bifurcates into two portions (*vid.* 4, *fig.* 2), which are inserted one on each side of the large pastern at its inferior part, sending an expansion to the heels of the sensible frog.

Flexor magnus pedis perforans posticus arises from the posterior and external parts of the head of the tibia; continuing down, it receives oblique fleshy fibres, which pass into its tendon (*vid. k, fig.* 1) from the inner edge of the tibia, and some from the outer edge; between which two places runs the posterior tibial artery, and some small branches of the vein and nerves. At the beginning of the hock it becomes one strong tendon, which enters into a groove, formed on the inner side of the calcaneum, and slides upon the articulation of the tibia and hock, having a cartilage interposed for the purpose of preventing friction. (*Vid. r, fig.* 1, *t, fig.* 2.) This groove it passes into, under an annular ligament appropriate to it, and in common likewise under the general annular ligament of the hock: soon, however, after its passage through this groove, it comes in contact with the tendon of the perforatus muscle (*z, fig.* 1), and is continued down on the inner side, having its posterior part covered by it, till it arrives at the pastern, when it becomes surrounded by the complete ring of the perforatus, to be inserted, as in the fore-extremities, on the coffin bone. The metacarpal nerve accompanies the gastrocnemius muscle at its origin, and continues down on the edge of the tendon of the perforans, passing with it through the annular ligament on its outer side; it then gains the inner side, and runs within it, to be divided and distributed over the foot and pastern (*vid. r, fig.* 1, *just above which it is seen.*) This and the preceding muscle are the flexors of the foot, but this latter is more immediately so; while the former, which is much more complex in its termina-

* The term *fascial ligament* may probably be objected to; but as I observed it formed from a continuation of the fascia, and that it performed the office of a ligament, I so named it, till it gains a better.

tions, and more divided in its uses, appears to belong to the hock, canon, and pasterns also; and forms a medium, whereby the actions of all the parts are uniform and consentaneous.

Flexor minus pedis perforans posticus arises at the posterior part of the head of the tibia; passing down on the outer side of the popliteus, it bends its course obliquely inwards, and proceeds under an annular ligament at the lateral internal part of the hock (*vid. fig.* 1): it unites about the middle of the canon (*vid.* 2, *fig.* 1) to the preceding, and to which it is thus an assistant.—*Extensor longus pedis posticus.* This is the first of three muscles, by which the extension of the foot is performed. (*Vid n, fig.* 2). It appears to arise first from around the tendon of the extensor of the canon, as well as by some tendinous fibres of its own; next from the head of the tibia at its outer part: it is then continued down, and becomes formed into a strong tendon (*vid. r, fig.* 2), which passes under the annular ligament, connected to the tendon of the next muscle by the little extensor, about the middle of the canon. (*Vid.* 1, *fig.* 1.) It then proceeds down in front of the canon, uniting with the next muscle, to be continued over the front of the pastern, receiving the expansion of the suspensory ligaments (*vid.* 7, *fig.* 2): it inserts itself, as in the fore-leg, into the anterior eminence of the coffin bone, and to which it is similar in its action, by extending the foot.—*Extensor lateralis pedis* forms the lateral extensor of Bourgelat, and is similar to the peroneus longus of the human; arising by a tendon from the lateral part of the external head of the femur, and likewise from the head of the fibula; running down, it becomes tendinous, and joins the artery some way under the annular ligament; then passing obliquely on the canon, it receives the fibres of the little extensor, and at the middle of the canon it unites with the extensor longus, to which it is an assistant.—*Extensor minor* is an expansion of fleshy fibres continued from the tendon of the extensor longus to the extensor lateralis, at the superior part of the canon, descending two or three inches. (*Vid.* 9, *fig.* 2.) Its principal use appears to be, that of approximating these two tendons, which must greatly assist them in their action by keeping them in a right line.

Ligaments and other Parts of the Hinder Extremities.

The bones of these parts have already been fully treated of, and the ligaments generally have been noticed with them; but there are others that are immediately appropriate to the motions of the parts, as well as some that connect them. It must be at once evident, that the articulation of the femur with the pelvis is formed with peculiar strength; so much so, there can be but little danger of dislocation. The thigh-bone is held in the acetabulum by the means of two ligaments, whose strength is very great: the capsular arises from around the neck of the femur immediately below its head (see *fig.* 1, *pl.* 8), and is inserted around the whole cavity of the acetabulum: but the principal strength is derived from a ligament improperly called round, which is connected by one end to a cavity in the head of the femur (see *v, fig.* 1, *pl.* 8), and by the other to a similar cavity in the acetabulum: by the conjoined force of these two it is evident this head must be held very firmly in its place.

The articulation of the thigh with the tibia and fibula is formed likewise with great art and strength; and that the muscles forming this joint, or rather that the muscles extending these bones, might act with greater power, there was given a patella, which allows them to move on the parts below without incumbrance, or without interrupting the ease of motion; for which purposes, therefore, the whirlbone, as farriers call it, glides smoothly over the articulation in front of the condyles of the femur. This bony appendage is retained in its situation by means of very strong ligaments, which appear formed in part of the fascia going over the joint; in part also from the tendons of the muscles of the thigh, and likewise partially from some proper ligamentous fibres. One of these, placed before, appears jointly formed of the rectus tendons extended over the patella, and is continued with a ligament from its inferior and anterior portion into the cavity in the front and head of the tibia (see *d*, *fig.* 1, 10, *fig.* 2): another arises from its outer side, is united to an expansion of the vastus externus muscle, and is inserted into the external part of the tubercle of the tibia. (See *c*, *fig.* 1, *b*, *fig.* 2.) A third slight one, which is removed in the plate to shew the joint, arises from the inner side of the patella, is continued with an expansion of the vastus internus, and inserted on the inner side of the head of the tibia. A fourth, coming from its outer side, inserts itself into the external condyle of the femur: there is likewise a correspondent one on the inner side, and, independent of these, there are some strong fibres carried across the patella: the general capsular ligament of the joint also invests this bone. From the great strength of the muscles inserted into the patella, it is sometimes fractured by a sudden effort; more frequently by a kick (see *Fractures*); and this would oftener happen, thick as the bone is, were it not for these continuations of the tendons over it, which greatly increase its strength and resistance.

The articulation of the femur with the tibia is held in its place principally by means of the crucial or cross ligaments, which originate from the posterior part of the femur, and, crossing each other within the joint, are inserted into the head of the tibia: the posterior arises within the articulation behind these ligaments, between the condyles, and terminates in the posterior part of the head of the tibia; which prevents this bone from being dislocated forward, as the crucial prevents both bones from being rotated or twisted on each other. There is likewise continued on each side, from the condyles to the femur, a tendon which answers the purpose of a lateral ligament. On the outer side this is effected (*vid. f*, *fig.* 2) by the tendon of the lateral extensor of the foot; and on the inner side by an expansion formed of part of the triceps, and vastus internus muscles. In the front of the condyles the tendon of the flexor of the canon arises, and by this means forms an additional connexion, and to which may be added the capsular ligament, which surrounds the ends of the bones. Within the joint is a cartilage, named, from its form, semilunar (3, *fig.* 1, *and c*, *fig.* 2), which is situated on the head of the tibia, is thicker in front than at its posterior part, and held in its situation by ligamentous fibres.

The hock is covered by the skin very strongly, which is likewise connected to it very closely, and is particularly thick at its posterior part. It may be remarked, that this is the most complex joint in the body, not excepting even the knee, and hence is very difficult to be understood. I have taken great pains to render my description of it clear, as well as accurate; nor can the student, with a proper attention to this, and a reference to the plates, fail of gaining an adequate idea of the formation of this very principal joint. It is invested generally by several layers of ligamentous substance; and immediately on removing the skin, there appears a very dense membrane spread over its surface, and over that of the leg, loosely, but evenly, forming the whole into one nearly smooth equal surface; that is, the tendons and ligaments underneath are neither very prominent nor distinct. This dense cellular substance may be raised in several successive layers; and when it is all removed, the muscles of the leg, the hock, and the parts below, will then be found to have still a strong tendinous or aponeurotic expansion firmly extended over them. This aponeurotic expansion appears to be a continuation of the fascia of the semimembranosus and tensor vaginæ femoris, carried down over the muscles of the tibia, and, becoming stronger as it advances, it seems to give a complete covering to each muscle, and perhaps assists to form the sheaths of their tendons, as well as to be reflected generally over the whole. If it be raised from the front of the leg, it seems to thicken as it gains the hollow formed between the tendo Achilles and the flexor of the foot, at which part it is very firm, and appears to end in two ligaments, which I have called fascial. These ligaments (*vid. p*, *fig.* 1, *and x*, *fig.* 2) appear more immediately formed from a very strong tendinous expansion from the inner surface of the perforatus muscle. The annular ligaments likewise seem formed in part from this, and in part from a particular ligamentous expansion arising from the inner and outer side of the tibia. This expansion, passing over and around the hock, attaches itself to the bones on the inner, outer, and posterior part, and is continued down over the tendons, as well anteriorly as posteriorly, to some inches below the hock, near to the origin of the elastic bifurcating ligaments, where it appears to be reflected over, from one small metacarpal bone to the other: from whence it passes down in the front, binding the extensor tendons to each other, and is reflected from the sides, but leaves the flexors uncovered, that thereby they might not be impeded in their motion; for these by being bound down, could not act to advantage, as situated too near the centre of motion: but which is not the case with the extensor tendons, which, from their situation, can only act when closely applied to the canon. Each of the tendons of the hock, and parts below, have a proper theca, which is smooth and loosely reflected over them; they have likewise another investment, which is a continuation of the general theca of the whole. Within the inner sheath, near to the termination of the tendons, those that have considerable actions to perform, and whose motions are extensive, are furnished with mucus to prevent the effects of friction, contained within proper capsules, or *bursæ mucosæ*. This mucus is furnished from the secreting arteries of the part; but which, on any violent and continued action produced in them from great exertions, take on an increased or a diseased secretion, and this forms what is erroneously called *windgall*. Sometimes this mucus seems not so much increased as diseased; more frequently, however, this collection is merely increased: at other times, however, after it has been simply increased, the more watery parts are absorbed, and the remainder becomes gelatinous, or even more solid.

Unless the pressure of these *sacs* be considerable upon the neighbouring parts, the injury produced by them is trivial; but from their being placed usually in the neighbourhood of organs having much motion, they may, when much enlarged, by that means become hurtful. Their most usual situation is in the bursæ of the hock behind (*vid.* 3, *fig.* 1), and in the pasterns (11, *fig.* 2), both before and behind. The sheaths and bursæ of the bifurcating tendons of the flexor of the canon are liable to them likewise, and the tendons both of the large and little flexor of the foot (*h* and *l*, *fig.* 1), at their entrance into their annular ligaments of the hock. The enlargement of the bursa of the tendon of the little flexor of the foot (*l*, *fig.* 1) frequently occasions *blood spavin;* for the superficial branch of the vein, passing over the inside of the hock, becomes by this means pressed upon, and its efforts to overcome this obstruction occasion an increase in its coats. The investing fascia covers also a bursa at the point of the hock, which is liable to a diseased enlargement similar to the others, and is then called a *capulet*. It is not, I am disposed to believe, so much the mechanical effects of the pressure on the surrounding parts which produce the mischief, as the diseased action brought on by this continued stimulus to any part, occasioning an alteration in its form, and an absorption of the portions immediately subject to the pressure, and perhaps from some other bodies foreign to their nature taking their place. Thus, from the increase of a bursa mucosa, the surrounding ligaments may be absorbed, and bony matter deposited in their room: for in all increased action of any of these parts in the horse there is a great disposition to a bony deposit, apparently from a law in the economy, whereby it endeavours to strengthen a weak part by a more solid support. Hence likewise exostosis of the bones of the hock, usually called *spavins*, may arise from some inflammation existing within either the tendon or ligaments; for these parts, having but few of the powers of life when they become enlarged, do not soon return to a healthy size; but the increased pressure may occasion an inflammation of some of the neighbouring bones; the constitution taking the alarm, throws out a preternatural quantity of osseous matter, which by this means occasions spavin.

Besides these general ligaments of the hock we have described, there are particular ones connecting the bones firmly together, and which are very difficult to make separate divisions of: they appear to run one into another; but from the course of the fibres we may distinguish, that each bone has a separate plan connecting it with the contiguous ones: these ligaments are not, however, so stretched, but that the bones of the joint have some motion on each other, which must assist the angle of the hock. Besides the individual ligamentous fibres from each of these bones to those in contact with them, there are two lateral ones extending from the lateral parts of the tibia, over the sides of the hock, firmly connecting the tibia; there are likewise other plans of fibres extending in front, and posteriorly. The capsular ligament of this joint arises from the tibia, unites with the fascial ligaments, and is continued over its various bones to the superior extremity of the canon. At the bottom of the tibia may be observed a curious cartilage, held in its situation by an appropriate ligament, interposed between the posterior and inferior head of that bone, and the tendon of the flexor of the foot. It is probable, that some of the inveterate lamenesses of the hock, where no disease appears, arise from an ossification of this cartilage. (*Vid. r*, *fig.* 1, 12, *fig.* 2.) There is likewise a very strong ligament at the posterior part of the astragalus, *below v*, *fig.* 2, continued over the bones of the hock posteriorly, and to the small metacarpal bones, serving to connect them with the canon; besides which they are furnished with fibres from their sides, which attachments become bony by age. It is this posterior ligament that becomes affected in the *curb*. The ligaments of the inferior joints are the same in the hinder, with those we have described as belonging to the fore extremities.

THE STRUCTURE, FUNCTIONS, AND ECONOMY OF THE FOOT.

Description of Plate IX.

Fig. I.—Represents a foot, with the arteries and veins injected with wax, from the pasterns; *a a*, the veins seen branching and ramifying over the foot, so as to form a complete network; *b b*, the arteries.

Fig. II.—Is a foot sawn down the middle, from just above the little pastern bone; *a*, the coffin bone; *b*, the coronet, or small pastern, which is here represented rather too long; *c*, the navicular bone, confined by its ligaments; *d d*, these ligaments of the navicular bone; *e*, the flexor tendon of the coronary bone; *f f*, the flexor tendon of the coffin bone; *g*, the sensible frog; *h h*, the sensible sole; *i*, the sensible laminæ; *k*, the coronary ligament; *l*, the extensor tendon of the coffin bone; *m*, the horny or insensible frog; *n*, the horny sole.

Fig. III.—Represents a foot without the hoof; *a*, the sensible laminæ; *b*, the laminæ of the sole continued from the front round the heels; *c*, the sensible sole; *d*, the sensible frog; *e*, the cartilaginous part of the frog continued from the lateral cartilage; *f f*, the vascular coronary ligament; *g g*, the lateral cartilages.

Fig. IV.—Shews the coffin, the navicular and coronary bones, with the flexor tendon attached, to shew its connexion with these bones; *a*, the coffin bone without the lateral cartilage of the left side; on the right is seen an ossification of the right lateral cartilage; *b*, the navicular or shuttle bone; *c*, the flexor tendon passing under the navicular bone to be inserted in the coffin; *d*, the articulating cavities in the coffin and navicular bones; *e*, a groove for the passage of blood vessels between the lateral processes of the coffin; *f*, the little pastern, or coronet bone.

DESCRIPTION OF THE FOOT.

THE foot of the horse presents a mechanism truly wonderful and curious, and most admirably adapted to the habits and manners of the animal. All the complexity of structure, ex-

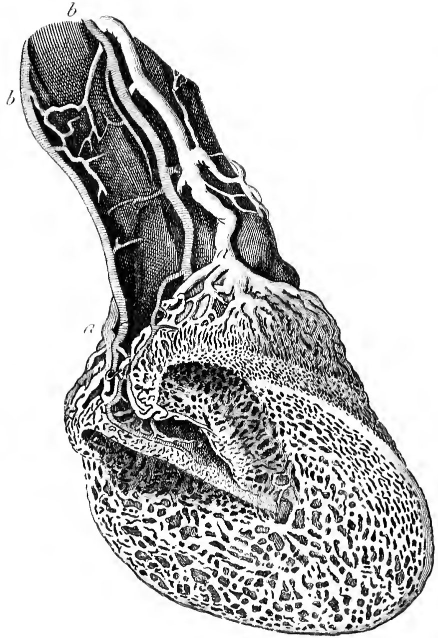


Fig. 4.

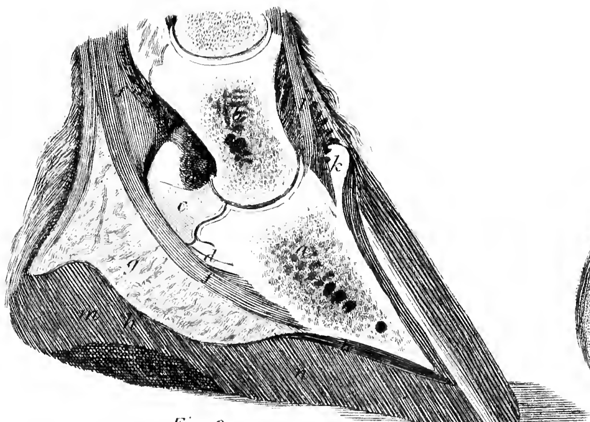


Fig. 2.

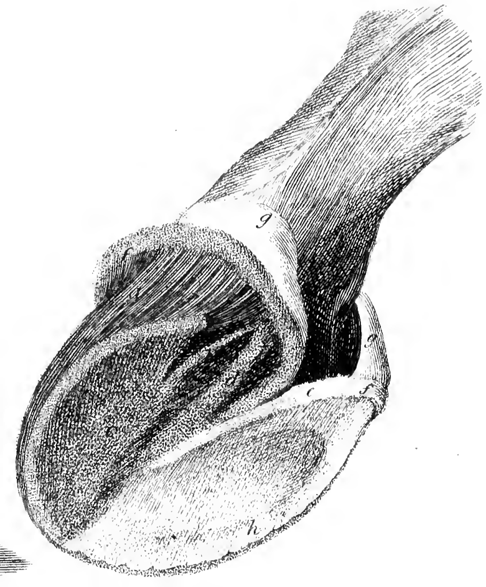


Fig. 3.

hibited in the numerous phalanges of the quadrumana, is here united into one. From the various artificial circumstances to which we subject this noble quadruped, such as stabling, hard roads, and the attachment of foreign substances, in the form of shoes, to counteract the effects of the unyielding surfaces travelled upon, the feet become peculiarly susceptible of disease; and as progression is the very foundation of the utility of the animal in question, so these diseases become objects of the greatest import to the veterinarian; to the proper understanding of which, an intimate acquaintance with the structure and economy of the parts composing the feet is absolutely necessary. In the colt, at birth, these are found less evolved than most of the external organs; were they more perfected, their hard surfaces might bruise the mother: but, on the contrary, at this early period the pasterns are long and upright, and instead of the extremities ending as in the adult, in a broad extended base, they terminate in a small circle of horny matter, pointed in front and behind, and presenting only the rudiments of a frog.

The parts composing the hind and fore feet are very similar; therefore, by describing one foot, we teach the form of the whole. The bones entering immediately into what is termed the foot, as being within the hoof, are the coffin, and the navicular or shuttle bone: articulating with these, and partly within the hoof, is the little pastern, or coronary bone, which is also much connected with the economy of the foot. The *coffin bone* corresponds in shape to the hoof. In front it has an eminence, to which the extending tendon is attached; the sides extend back into two lateral processes, to the upper of which are fixed the lateral cartilages. Its superior surface presents two articular cavities, and its lower is vaulted, and attaches the flexor tendon. Its anterior part is covered by the sensible laminæ, and its whole structure is spongy *(vid. y, pl. of Skeleton; vid. a, fig.* 2, *and a, d, fig.* 4, *of pl.* 9), and curiously (particularly on its outer surface) formed into innumerable small ridges longitudinally disposed, evidently serving the purpose of favourable attachment for the laminæ. This curious texture becomes nearly obliterated in the old horse. The *navicular bone,* called likewise the nut and shuttle, is placed at the posterior part of the coffin bone, attached to that, and to the coronary also, by ligaments; one of which passes from its lower part into the posterior portion of the coffin; two others stretch from its upper surface, and are inserted into the coronary bone *.

* This bone and its attachments are liable to injuries, usually sudden ones, by which the bone itself becomes fractured, or torn from its attachments, when incurable lameness ensues. Such a peculiar form of founder was early noticed by Osmer and La Fosse, and since by Mr. Turner.

The *coronary*, or *small pastern bone*, is seen in *fig.* 4, *f*, *and fig.* 2, *b*, *pl.* 9, and articulates with the coffin and with the navicular, to both of which it is united by capsular and appropriate ligaments; and upon this the great pastern bone rests. The *lateral cartilages* are affixed, one to each side of the coffin bone by indentation; they are externally convex, and internally are slightly concave, having some portion covered by the hoof, and some without it. The *laminæ* are vascular sensible productions of the cutis, possessing elasticity, and being situate all round the anterior surface of the coffin bone, in leaves, or lamellæ: they are about five hundred in number, and which are received between correspondent horny lamellæ in the hoof. The *coronary ligament* is a vascular expansion, projecting and extending around the coronet to the back of the frog; from the vessels of which the hoof is secreted. The *extensor tendon* is inserted under these parts into the anterior eminence of the coffin, and the *flexor tendon* affixes itself to the vaulted arch posteriorly. The *sensible frog* is situated next to this, and is made up of semi-cartilaginous and ligamentous substances, with some reticulated tendinous layers and adipose matter; and, by the elasticity of which construction, the expansion of parts is greatly influenced: the navicular bone rests in some degree on this and on the flexor tendon. The *sensible sole* lies under that part of the coffin, covered by neither of these latter substances. The *hoof* is a hard insensible box, which covers and protects almost the whole of these parts. Having thus mentioned the parts in this order, we shall retrace them in a contrary one, by which the student will be familiarized to their description.

The *hoof* of the horse is a horny envelopement, secreted from an expansion of the cutis, in a manner similar to that in which the human nail is formed from the portion of cutis termed the *quick*. Nature, who delights in similitudes, keeps up the likeness, however, in a less degree here than is usual: for in the horse, the nail envelopes the phalange inferiorly as well as superiorly; both surfaces meeting to form a round blunt edge which admirably corresponds with the wants of the animal. The hoof in its natural state is conical, but by no means so perfectly so as has generally been taught. Mr. Bracy Clark expressively describes it as an oblique cylinder truncated, with the truncated extremity brought to the ground: but age, artificial habits, and the application of shoes, tend much to alter its natural appearance. The hoof presents a considerable degree of obliquity in front, where also it is much higher than in any other part, the quarters or walls being less oblique and less high; and, as it approaches the heels, the obliquity becomes still more decreased, and the height also. In a natural state the hoof is also widest at the outer side of the inferior margin, by which a broader surface of support is afforded without encumbering motion, or increasing a tendency to cut. The structure of the hoof is fibrous, with its fibres longitudinally disposed, and which are separable by maceration. Heat and a want of moisture will also tend to separate them, as we know by those spontaneous divisions which frequently take place in hard dry hoofs, called *sand cracks*. The *crust* of the hoof is all the horny part that appears laterally and anteriorly when a foot is placed on the ground; presenting surfaces externally smooth and convex, but internally concave and laminated. In the fore feet, the thickest and strongest portion of horn is placed in front, as this part is the most pressed on and most exerted. The *quarters*, so called, are the lateral parts or walls of the crust; and, as in the fore feet, the anterior portion of each hoof is the thickest, so, in the hinder ones, the sides are by much the strongest: thus the fore shoes are principally fastened towards the front, but the hinder ones more towards the quarters. The inner side of the hoof is the weakest, and also rather the highest; and which natural formation is not in general attended to by smiths and farriers; for as this quarter is weaker than the other, so it always wears faster, and which tendency ought to be counteracted by general care, and also by particular management in the shoeing: instead of which, the outer heel may frequently be observed to be the highest, before and behind, which, as it reverses the natural line of pressure, and produces an undue bearing on the weaker part, so it proves a fruitful source of splents, curbs, spavins, and contractions. The lateral parts, towards the heels, in both fore and hind feet, become thin in proportion as they proceed backwards; which appears a wise provision, that they might the more readily yield to pressure; and having reached the heels, the horn makes a sudden inflection inwards, as we shall hereafter describe. At its upper margin, the circumference of the hoof is whiter, softer, and thinner, than at the other parts; and this upper surface is internally hollowed out, and is called the *coronary ring*, receiving into it a vascular prolongation of the cutis, which has received, rather improperly, the name of the *coronary ligament* (*vid. k, f f, fig.* 3, and *k, fig.* 2, *pl.* 9). Immediately contiguous to which, but rather under it, exists an elongation of dense substance, said to be a true continuation of the horny frog, as we shall notice more particularly. From the vascular coronary ligament is secreted the horn; and though the laminæ are also capable of secreting horn, as we know from what occurs in scoring the hoof, yet it is principally from this source that this substance is produced. That this coronary ligament, as it is termed, is not intended as a means of attachment between the hoof and its internal parts, is evident, from the ease with which they may be separated from each other; and also further, from the circumstance of there being a complex apparatus, afterwards to be described, purposely to effect this union in the completest manner. Posteriorly, the hoof presents its inflections, with the intermediate space filled up by the fleshy or soft heels, formed from the frog inferiorly: towards the middle, it is filled by the elastic matter in which the sensible sole loses itself; and superiorly, it contains the cartilages covered with integuments and cellular substance. It was necessary that there should be a break to the continuity of the hoof, to lessen the effects of concussion and resistance; and the interposed substances we have described, that fill up the chasm, are, for this reason, of the most elastic nature. As, during life, the secretion of the hoof continues, so it was necessary that means should be provided for its waste or decay. The natural wear is usually sufficient for this in a state of nature; but when this is not commensurate with the growth, the extreme ends, beyond the reach of the tenacity of the matter, become brittle, and drop off in flakes.

The *horny sole*.—The under concave elastic surface of the hoof is so called (*vid. n, fig.* 2, *pl.* 9), and which is not so fibrous or brittle as the crust: it is also thicker at the circumference, where it unites with the crust of the hoof, than it is towards its centre. Its concavity admirably adapts it to embrace the ground, and prevent the dangers of slipping: but this concavity is not always equal; on the contrary, by the pressure of the parts above, it descends momentarily by virtue of its elasticity, which must decrease its concavity, and at the same time must greatly relieve the body from the effects of concussion. This descent of the sole should be carefully kept in mind by the veterinarian, particularly by the operative smith; for if a shoe be so placed as to rest upon this horny sole, it cannot descend lower, and thus the sensible sole above it must be pressed between the edges of the coffin bone and horn; when if this pressure be considerable, inflammation and abscess are the certain consequences.

The *frog* is the triangular horny portion that fills up the natural excavation of the under surface of the hoof. (*Vid. m, fig.* 2, *pl.* 9.) This elastic pad swells itself out beyond the immediate part it is in contact with, but not so much in general as to be beyond the level of the outer surface of the crust: it however is sufficiently prominent as evidently to receive its share of pressure. A horizontal section of the foot will shew the frog to be completely a distinct secretion from the other horn; the line of separation, and the difference in structure, being rendered very apparent between this and the horny parts it is connected with. In fact, its connexion seems little affected by a mixture of fibres, but principally by an internal prolongation of cuticular matter; and which connexions are propagated throughout all these parts. To the sensible frog above, it is also intimately connected by an adhesion arising from inosculation of vessels; but more particularly it appears connected to it by a process of itself, which is indented into the sensible frog purposely to strengthen the union between the two. This connection may be readily seen in a horizontal section of the foot, and it appears also in *pl.* 9. The posterior superior part of the frog is covered by the fatty elastic substance, into which the sensible sole blends itself, forming the soft fleshy heels: from whence its lateral parts appear to be continued by a true prolongation; or, otherwise, a firm lamen of elastic horny matter is reflected from it to extend around the under part of the coronary ring immediately below the vascular coronary ligament. Mr. Bracy Clark, who was the first that accurately described it, calls it the *frog stay*, its use being, as he supposes, designed to support the frog in its situation. Mr. Coleman, I believe, denies its existence altogether; but an accurate dissection of the parts certainly demonstrates a prolongation of the frog, or otherwise a continuation of an elastic matter reflected from it. Mr. Clark, in return, denies the existence of the coronary ligament as described by Mr. Coleman; but which appears to be equally erroneous on his part also. A vascular fold or enlargement of the cutis, evidently thickened at this part to increase the surface of secretion, does actually exist: innumerable dissections have made the appearance familiar to me. Nevertheless, the disagreement between these two authors on the subject, is rather more in name than substance; for Mr. Clark allows that there is a process or enlargement of the skin within the coronary ring, but that it is not separable by maceration. This is therefore the coronary ligament described by Mr. Coleman, though probably under a questionable name.

It has been observed, with considerable truth, that the real quantity of horny matter, even in a full-formed frog, is not so great as would appear from a simple inspection of the under surface of the foot; for the frog is placed as an inverted arch with regard to the other parts (*vid. fig.* 2, *pl.* 9): consequently smiths cannot cut with impunity so much as they sometimes do; but in breadth a full healthy frog forms not less than a sixth part of the whole. Between the bifurcations of this part, a deep sinuosity appears, which is called its *cleft*; by means of which division the frog obtains a power of expansion, and also a capability of adapting itself to the uneven surfaces the foot may pass over. The formation of the horny frog is effected by secretion from a vascular substance immediately over it, called the sensible frog: it is hence subjected to the same laws with the horny parts of the hoof and sole; and therefore when grown to a useless extent, it scales and detaches itself, and breaks away as that does. But it is necessary to observe, the growth of the frog is very seldom inordinate; on the contrary, in horses who have been often shod, more particularly if there exist the slightest disposition to contraction, the growth is hardly commensurate with the wear; and, in such cases, an imprudent smith may pare more away in three minutes than will grow in three months.

Modern physiologists have been very much divided in their opinions relative to the use of the frog; but all agree that it must be a very important part. Among the moderns, La Fosse first drew the attention more decidedly to the impropriety of paring it away, as it appeared to him so necessary a guard to the flexor tendon. Mr. Freeman considered it in a similar point of view, and also that, in conjunction with the navicular bone, it greatly assisted the spring of the tendon. Mr. Coleman denies that it can do either of these in any considerable degree, for it is not, he observes, so situated as wholly to guard the flexor tendon; nor can it so act as to assist as a spring to it: but he is at great pains to prove that its principal and determinate use is to resist the contraction of the hoof, to which the artificial habits of the animal give him a constant tendency; but which tendency, the frog, when of its ordinary size, is fully equal to counteract. The Professor brings forward many ingenious arguments to prove that this is effected by the pressure of the full grown horny frog, which, acting on the sensible frog, enables that, by its connexions with the lateral cartilages, to expand them, and that they, in return, force open the hoof.

Nevertheless it appears to me, that, upon an extended view of the matter, and which is borne out by a minute examination of the parts, we should not be led to circumscribe the use of this organ to any one of these operations solely, but should rather conclude that it acts in various salutary ways. Its most important office appears to be that which a natural philosopher would at once assign it on viewing the external foot; for it presents itself evidently as a natural wedge to prevent slipping and sliding on smooth surfaces. It may be viewed, also, as an extended point of support to the soft elastic parts above it, which parts we know descend by pressure; and probably it acts importantly also as an antagonist to the downward and backward direction of the internal parts of the foot, which occur through the medium of the elasticity of the laminæ. That it may also assist to guard the flexor tendon is probable, but not in the way supposed. It more probably acts by giving a solidity of support to the insertion of this tendon, by pressing upon it during its strong extensions; and which is rendered more necessary from the suddenness and acuteness of termination in the tendon. An animal so weighty as the horse, and yet so speedy, required a mechanism of support peculiarly elastic: we accordingly find his foot so constructed as to be made up of springs: and, as it has been observed, that in a well formed foot the frog forms not less than one-sixth of the circumference; and as also it must be taken into the account, that, in some actions in which the horse first meets the ground with the hinder part of the foot (as is probably the case in the gallop of full speed and in very wide leaps); so, in such cases, to keep up the general spring of the parts, it was necessary that the hinder parts of the foot should be furnished with organs equally as elastic as those of the fore parts. And though it is certainly not in the usual actions of progression, that the heel is first opposed to the ground, yet that there are times when it does so; and that this apparatus is intended to act at those times may be fairly presumed. Nor would it be prudent to deny, that the frog may *assist* in preventing contraction; not only by its simple resistance, but also by its action upon the elastic cartilages; yet it is presumed that it operates in this manner in a subordinate degree to that attributed to it by Mr. Coleman. Indeed, there are such other contrivances to effect this alledged expansion, as necessarily throw a shade over the action of the frog in this point of view.

As the very form of this organ shews that it was intended by Nature to meet the ground; as also the reasons stated evince that it is essentially necessary to the well being of the foot that it should do so, and that this opposition of it to the surface of the ground is not so much by descent as by actual application; so the impropriety of cutting it away, as practised by some shoeing smiths, is self evident, and cannot be too much reprobated. Nevertheless, as the application of the laws by which dead matter is acted upon, to the operations of living organs, is that which has led to the greatest errors in physiology; so also a reasoning, founded on the uses of the organs to an animal *purely in a state of nature,* leads into error, when applied too closely to the same animal when *living a life of art.* From this is meant to be inferred, that though the constant and full application of the frog to the ground in a state of nature is not only harmless, but necessary; yet it does not appear but that in a horse living a life of art, and subjected to long journies on hard roads, if a full and constant application of the frog were to take place against these surfaces, it would probably not only wear away faster than it should, seeing it is not so bulky as a common inspection would make it appear; but that also, by such an extra degree of pressure, there is reason to know that the parts immediately placed over it would become bruised. Such a paring therefore, particularly in hard working horses, is proper as will keep it rather within, or at least not beyond, the level of the under surface of the circumference of the sole: the heels of the shoe being then sufficient to relieve it from inordinate pressure, as the yielding surfaces of the ground will still allow it sufficient application to operate in its useful purposes in progression. In general cases, however, it is apt to be pared below this; and as the regeneration, particularly in some feet, is very slow, so the evil becomes aggravated.

The *bars.*—We have already fully explained, that the crust of the hoof does not terminate at the heels, as a superficial observation might lead one to conclude; but that having gained the heels, it turns acutely inwards, decreasing in extent, and lying itself obliquely along each side of the frog to terminate at the point. The bars, or *binders,* as they are often termed by smiths and farriers, cannot be considered, therefore, as parts exclusively belonging tc the sole; on the contrary, they more immediately belong to the crust of the hoof. If the subject be accurately attended to, they will be found to be infinitely more important in their office than is generally imagined. In the first place, it was essentially necessary to destroy the effects of resistance, and to lessen concussion, that the hoof should not extend around the foot; but that it should be interrupted by a chasm. It was also as necessary to guard against contraction, that it should not end abruptly around this chasm; Nature therefore has wisely effected this termination in a way that not only increases the general elasticity of the foot, but also makes it the principal means in preventing contraction. The great obliquity of the bars is evidently intended for this very purpose; and so long as this outward bearing remains, and they are suffered to maintain their due approach to the ground; so long they must almost necessarily prove a *bar* to contraction. But the smith conceiving these parts useless, because he cannot immediately see their operation, cuts them out; and thus the foot loses one of its principal supports: and it is the peculiar but unfortunate tendency of this evil to aggravate its cause as well as its effects; for, as contraction commences, the obliquity of the bars decreases, and thus, in a twofold degree, is the mischief multiplied. Other circumstances may tend more immediately to hasten contraction; but the destruction of these parts is certainly pregnant with the evil. The bars, therefore, seem peculiarly designed to operate against the tendency to contraction which feet, long used on hard ground, will naturally become liable to; and they also appear to operate particularly in expanding the lower points of the heels, as the cartilages do by widening the upper parts of the same.

It may be worth while to pause a few moments to inquire into the cause of the general disposition in smiths to pare the foot unnecessarily. This habit is however more erroneous in the *part* operated on than in the *quantity* taken away: for if I am right in my conjecture, and I draw my inferences from a very extended experience, more evil results from a *want of paring* than arises from all the injudicious and extravagant cutting that occurs, great as this may be. It appears that the smiths wage war against the posterior and central parts of the foot instead of the circumference; and as these posterior and central parts are more slow in their reproduction, while the others grow more quickly, so the effects prove still more hurtful. A healthy frog presents a full rounded appearance, and meets the eye forcibly; and even the ease with which it may be cut will alone invite the knife or butteris, and this the more, as when pared it leaves a neat clean appearance. But it would not exhibit this appearance of neatness so well, if any thing remained alongside to impede the view; therefore the *bars* are also removed to effect this, to clear all obstructions, and to make a still smoother and clearer surface: "for what possible use," a smith says to himself, "can this hard ridge be of alongside the frog?" Nor does the evil stop here, for as most feet, or, at least, a great number, present some incipient contraction; so it is observed by the smiths, that the inflections of the heels in these cases approximate and press on the horny frog, as well likewise on the elastic matter forming the heels; and in cases where the contraction is considerable, these parts really appear to "*bind in,*" as it is termed. Not considering, therefore, the immediate intention of these inflections, these persons are led to regard them as the offending parts, and they are accordingly cut out also. The very term given to this latter operation is fascinating, and shews the hold it has upon their minds: it can hardly be necessary for me to notice that this is popularly called "*opening the heels;*" but which it would not be difficult to prove might be more correctly called shutting the heels. However, as the cause of truth should ever be predominant, so it must be acknowledged that wiser persons than the generality of smiths are, might be incautiously led into this error; because, in many instances, a salutary effect is absolutely observed immediately to follow this operation, though a hurtful one be the future consequence; as where the approximation of the inflections is such, or, as more popularly expressed, where the binders draw in, so as actually to press upon the intervening substances; in which case real pain and lameness is occasioned by their immediate pressure. In such instances, also, the practice may be admissible to give present relief; but the evil resulting from it should at the same time be counteracted, by the means recommended under contracted feet. From this detail of the important functions of these parts, and from the remarks that follow this detail, it may therefore be inferred how grossly erroneous must be the system that induces the smith to prepare a foot for shoeing, by totally removing the bars, and partially doing the same by the frog; at the same time that they probably allow the sole and crust to retain an improper quantity of horn. From these remarks may be also learned, but more particularly from what will follow when the subject of contracted feet is considered; that the popular outcry against *paring of the foot* is wrongly directed: for, were a similar degree of paring practised on the sole and crust, instead of the bars and frog, a very great number of feet would be benefited by it

The Interior of the Foot.

The first part that presents itself when the hoof is removed, is the *sensible,* or, as it is sometimes termed, the *fleshy sole (vid. h, fig. 2, h, fig. 3, pl. 9),* which is a vascular expansion covering a considerable portion of the under surface of the coffin bone; extending beyond its posterior part, but leaving a triangular space for the vascular expansion of the sensible frog. As the sensible sole passes behind the coffin bone, it becomes thicker and more elastic, and attaches itself to the cartilages, as also slightly to the navicular bone. Throughout its whole upper surface it is formed of a ligamentous or tendinous substance, but the whole of the under surface is covered with an expansion of the true skin highly vascular, and from which is secreted the horny sole. The vascularity of this part renders it very susceptible of inflammation, and only a moderate degree of pressure upon it from its horny covering will produce this; thus, if by accident the shoe should press on the horny sole, it immediately inflames, and pus forms; and as the matter becomes confined by the horn, its attempts to find a vent make it extend itself around, which the farriers call "*underrunning.*" When pressure occurs also at the heels, if it be not very violent, a bruise takes place: and as the sole is less vascular and less irritable at this part, so active inflammation seldom follows, but blood is deposited, and a *corn* is the consequence. If the pressure be very great, particularly if any foreign substance intrude itself, as gravel, &c., then the same consequences are produced as in the other parts of the sole, and pus forms: similar effects also ensue frequently from punctures by nails or other sharp bodies. The sensible sole furnishes a few laminæ to correspond with those in the heels of the horny sole.

The *sensible frog (vid. g, fig. 2 and fig. 3, pl. 9)* presents a very curious structure of ligamentous and tendinous expansions, the laminæ of which are in divers directions, but with its under surface covered by a vascular expansion corresponding in shape to the horny frog, which is secreted from it. It lies in an interval formed within the sensible sole, attached by its point to the concave inferior surface of the coffin bone, with its heels expanding posteriorly beyond that, and attached to the posterior and lower portions of the lateral cartilages; at which part they are connected with, or degenerate into a lax cartilaginous substance, which, united with cellular matter, and the coverings of the skin, form the rounded bulbs of the fleshy heels. An inflammation of this sensible frog alters its secretion from horn into pus or matter, which finding its most ready exit between the cleft of the horny frog, is then called a *running thrush.* As this part is very prone to this diseased secretion, so thrushes are very common; appearing now and then in some measure constitutional: but much more frequently they originate from some injury done to the sensible frog, and are kept up by a continuance of the same, or by the application of other causes favourable to the production of inflammation in the part. The form and situation of the sensible frog may be seen in *pl.* 9, *fig.* 2, *g*; *fig.* 3, *d*, *e*.

Above the sensible frog and sole, the *flexor perforans tendon* appears, inserting itself into the vaulted arch of the coffin; the perforatus is inserted into the large and small pastern bones, but it sends down an expansion to the heels of the sensible frog. The flexor perforans tendon also, in its passage, gives ligamentous productions which attach the lateral cartilages, and form a kind of capsular ligament for the navicular bone: it becomes finally inserted into the surface of the arch of the coffin, having thus its upper surface applied to that bone, and its lower to the sensible frog.

The *lateral cartilages* are one to each side, and, from the great peculiarity of their situation, they must be considered as very important parts. They are fixed into indented grooves in the lateral upper surfaces of the coffin bone, extending in front almost to each other, separated only by the insertion of the great extensor of the foot. Independent of their being implanted into the coffin bone, they are still more strongly held in their situation by means of ligamentous fibres, as well as by lateral connexions to the ligaments of the coffin and navicular bones, and likewise by a ligament given from the flexor tendon: their situation may be best learned by a reference to *pl.* 9, *g*, *g*, *fig.* 3. They are externally convex, and internally concave, having their middle portion the highest, the extremities gradually becoming thinner and smaller; the posterior portions pass beyond the lateral processes of the coffin bone, and unite with the semi-cartilaginous substance of the sensible frog. They are partly within and partly without the hoof, and are covered at their lower portion by the coronary ligament, which, by being extended over them, prevents their too great dilatation: to their lower portion likewise the attachment of the laminæ takes place. Within the concavity formed by the extension of the cartilages beyond the coffin bone (see *fig.* 3, *pl.* 9), is lodged the ligamentous fatty substance forming the upper and posterior part of the fleshy frog. From a mistaken opinion of La Fosse, who asserted, that in quittor the cartilages must be wholly removed, much unnecessary extirpation frequently took place, when the improvements brought about by the French school first appeared among us. But we now know, that though it requires a violent process, yet that these parts will ulcerate, exfoliate, and heal like other parts. The *uses* of these cartilages, as before observed, are very important, and without them the foot would have been a very incomplete machine. Divested of these, the coffin bone appears but a small part, compared to the coffin that incloses it: but increased by the attachment of these, it presents a very extensive body, serving all the purposes of bone, yet being almost one half of it elastic, instead of solid and unyielding. These cartilages evidently act upon all the upper portions of the foot, and in one part inclose the joint; but more particularly they appear to operate in the extension of the upper half of the horn of the hoof, as the bars do in the lower half. From continued pressure, these cartilages are very apt to ossify, particularly in draught horses.

The *sensible laminæ.* (*Vid. a, fig.* 3, *pl.* 9, also *fig.* 1, *pl.* 7.)—In describing the hoof, we had occasion to notice that its internal surface was lined with numerous horny lamellæ, which possessed a considerable degree of elasticity obliquely downwards and backwards, with an arrangement of their fibres corresponding to this direction. These are, in contradistinction to those we are going to describe, called the *insensible laminæ.* The whole circumference of the coffin bone from above downwards, is covered with about five hundred semicartilaginous leaves, each of which is received between, and firmly attached to two of the elastic laminæ of the hoof, just noticed, and consequently each horny process is received between two sensible ones. It is therefore evident, that the surface of attachment between the hoof and the internal parts (for the coffin bone governs all the rest) must be most intimate and most extensive. Indeed it is so much so, that few accidents can separate these parts: inflammation, which dissolves the bond of union, is alone able to effect it. It is by means also of these principally, that the foot enjoys its admirable spring, and almost wholly its support also. It may, perhaps, at first sight, be imagined that the sole bears the superincumbent weight resting upon the coffin bone; but nothing is farther from the real truth: indeed, we find the sensible sole can bear little *continued* pressure, though its elasticity and form enable it to bear a portion of *momentary* pressure, and to descend in the efforts of the horse; being then moderately pressed on by the parts above. But it in no instance receives one twentieth part of the weight of that portion of the machine acting upon the coffin bone; on the contrary, it receives only so much as the elastic elongations of the laminæ allow it. That these laminæ are the means whereby the foot is sustained, appears evident from the following fact: A horse in whom both horny soles of the fore-feet had been removed, and who was remarkably given to kicking, still continued the practice, lashing out behind with both feet with great violence; yet no injury was sustained by the fore feet. From this it is clear, that had the sole been intended to sustain the superincumbent weight, the feet must have actually forced themselves through the hoofs. The sensible laminæ are therefore the important organs whereby the internal foot is held in its situation within the hoof; and it is by these means that the foot enjoys the principal portion of its ease, elasticity, and freedom, from the effects of concussion: for the foot is internally observed to be oblique from behind to before; but the weight is not oblique, but nearly perpendicular: hence it is evident there must be a constant tendency to dislocation between the internal parts of the foot, the coffin bone being pressed down in a direction different from that of the internal surface of the hoof. As the laminæ both of the hoof and of the coffin are elastic singly, so they are also highly so conjointly, and their joint action must allow a very considerable alteration in the position of the coffin bone obliquely downwards and backwards. Thus it would appear that, during the action of progression, the weight is first thrown perpendicularly on the pastern; from whence it is transmitted to the coffin principally, and to the navicular subordinately: but that the hard medium of these bones, and the equally hard medium of the earth, might not produce concussion and a hurtful pressure, these elastic laminated springs are admirably contrived, whereby the weight is distributed over a vast extent of surface; and that no auxiliary aid might be wanting, so was superadded the vaulted arch of the sole, which still further prevents concussion. It is evident also that this oblique and backward direction of the coffin bone, resulting from the elasticity of these leafy processes, must greatly tend to prevent contraction. Their formation appears dependent on the vascular cutis, of which they are productions: they are longer in front than at the sides, and at the sides than behind, but are every where most intimately connected with the coffin bone. Acute founder appears to arise from an inflammation of these parts: they are also capable of a more slow or chronic inflammation, in which they lose their elasticity, and, yielding to the pressure of the coffin bone, they elongate, and permit it to rest on the sole, which, by this pressure, becomes first planiform, and then externally convex, forming what is termed *pumice footed.*

The *vessels* and *nerves* of the foot have been particularly described in the Angiology and Neurology, to which I would refer the student. The vascular appearance may likewise be gained by a reference to *pl.* 9, *fig.* 1, where a foot with the vessels injected with wax is accurately represented. The *arteries (vid. b, b)* may be seen situated posterior to the veins, one on each side, which first give each a branch to the coronet, and then are ramified throughout the anterior and posterior parts of the foot. The *veins* pass more anteriorly, a large branch to each side, when they ramify in a similar manner, but are infinitely more numerous, forming a complete network around the internal parts of the foot, as well as penetrating its substance, and having the peculiarity of no valves to obstruct their passage. (*Vid. a, a, fig.* 1.) The *nerves* are two small branches posterior to the arteries, passing down and giving rami to the different parts of the foot *(vid. Neurotomy)*.

To the veterinarian I would again remark, that an intimate knowledge of the structure and economy of the foot forms almost the groundwork of his practice; and that he cannot study too closely the various authorities from whence he may draw information. To him, and to the inquisitive and curious reader, I would recommend the works of Mr. Coleman, Mr. Freeman, and Mr. Bracy Clark; writers who have professedly treated on the foot of the horse.

Section XVIII.

HYGROLOGY.

THE fluids of the body do not admit of a ready division; they are very numerous, and their properties various. They are mostly separated, or secreted, from that grand fluid of the body, the blood.

Blood is contained in the heart, arteries, and veins; is formed with the animal, and continues with him through life: it is circulatory and compounded, appearing red in the arteries, and purple in the veins; and contains iron, albumen, gelatin, fibrin, and water, with some other components: it has already been very fully explained.

Gastric juice is a limpid colourless fluid, yielding but few sensible qualities to a chemical test, and has a property of coagulating milk. It is secreted from the arteries of the stomach, and is in less quantity in the horse, proportional to his size, than in any other animal.

Chyle is a fluid of different appearances in different animals: in the horse it is of a milky hue; and is gained from the decomposition produced by the gastric, biliary, pancreatic, and intestinal juices, acting on the chyme; and appears intended, when so formed, to add support to the animal, by increasing and repairing the blood.

Lymphatic fluid is necessarily very various, as it is received from every part of the body; it is elaborated in the lymphatic glands, and mixed with the chyle.

Milk is a fluid secreted in the mammæ of lactiferous animals, in some degree animalized, and partaking of the nature of chyle: it separates into cream, coagulum or curd, and serum or whey; and from its being possessed of phosphate of lime, has been supposed to be useful in the first formation of bone: its principal use is for the nutrition of the foal.

Pancreatic juice is a fluid resembling the salivary secretion, and is apparently intended for the dilution of the chyle, and probably effecting some decomposition in it.

Bile appears first to effect a decomposition of the chyle, and then to become the natural purge to the intestines. It has some of the qualities of soap, but wants others, and is secreted from the venous blood in the liver: in the horse it is only of one kind, the pungent cystic bile being wanting in him.

Urine is a turbid yellow fluid, at times transparent, separated from the blood in the kidneys, and is apparently excrementitious. Its properties partake of the nature of the food; and its quantity is relative as well to that, as to the season of the year and the state of the skin. Chemistry separates several salts from it, and an animal matter: phosphorus is made from it, and it enters into several manufacturing processes.

Mucus is a general thick fluid, secreted universally upon those membranes termed mucous. It is of a mild, bland quality, intended to keep the parts moist, to protect them from improper irritation, and to keep them *apt* to the impression of proper irritation.

Saliva is a fluid very slightly saline, whereby it gives relish to the food, and dilutes it preparatory to its passage into the stomach. It possesses some phosphate, from whence arises its disposition to form a concrete on the teeth, and earth within the glands. It is secreted from the maxillary, parotid, and sublingual glands.

Lachrymal secretion.—This does not materially differ from saliva, and is secreted by the lachrymal glands, to moisten the eye, and keep it transparent.

Semen is a fluid, secreted from the blood in the testes. It contains mucilage, phosphate and muriate of soda, and phosphate of lime; but no light is thrown upon its ultimate ends by any analyzation of it. The microscope detects animalculæ in it.

Synovia is an animal mucilage, secreted by the inner membrane of the joints, to prevent attrition.

Interstitial fluid is a serous secretion poured out into all the cavities, to prevent friction and an improper union of parts.

Fat is a condensed inflammable juice, spread over almost the whole body, secreted within the cells of the adipose membrane, by the arteries ramifying on their inner surface; it is of various consistencies in the different parts, and in different animals; forming grease in the horse, tallow in sheep and oxen, lard in the hog, and train oil and spermaceti in fish: it is not miscible in water, and, like oil, it forms soap with alkalies. It is a protection to parts, and a depôt for occasional inanition.

Sweat is an excrementitious fluid; in some horses of a strong smell, particularly when feeding on grass: its properties are not in reality differing from urine; and where one is formed in great quantities, the other is usually lessened.

HAVING proceeded thus far in my labours, I would pause a few moments, to entreat the veterinary student, who may have followed me attentively through the foregoing pages, not to be deterred by the seemingly dry and rugged detail, from entering still more deeply into anatomical and physiological investigations. Elaborate and intricate as they may at first appear, each succeeding day of study will open a new ray of intellectual light, and each new fact will forcibly impress the mind, until that which commenced with pain will end in pleasure. Upon a due acquirement of these important branches of medical knowledge, can the student alone hope to build himself a solid reputation. The possession of these will prove a guide and way-post in all his future professional pursuits, and become the means of preventing those fatal mistakes which his fellow practitioners, less informed, will infallibly fall into. Without a proper conversance with these key-stones of the healing art, his practice can be at best but a fortunately *empirical* one. He may possibly accumulate wealth, but he can never disseminate improvement. Educated originally for the practice of human medicine, and grounding on that more than twenty years' practice and teaching of the veterinary art, I may presume to form some judgment as to the importance of these acquirements, and may be allowed with confidence to recommend them to the strict attention of younger veterinarians: in which having well grounded themselves, I invite them, with the best intentions towards their welfare, to proceed with me through the remaining pages to a consideration of the diseases of this noble animal, whose admirable qualities render a life devoted to the melioration of his sufferings, natural and acquired, not an unpleasing task.

In the following detail of maladies and their cure, I have carefully avoided idle and unnecessary theory; yet I have endeavoured to join cause and effect, and to blend the reason with the act; thereby attempting to teach the curative art by *principles* more than by *recipes:* nevertheless, the matter is so conducted, that the amateur who chooses to strip it of its systematic and artificial dress, may find a ready and safe guide to a *domestic practice.* In the first editions I borrowed little from others, for little was known. In the latter editions, I have introduced the numerous important improvements in the art made by the ingenious Professors of the Veterinary College and their pupils, and I have acknowledged and noted the debt: but I cannot say thus much of others; for I may remark, without fear of contradiction, that some among the most popular Veterinary Works of the present day owe much to the former editions of the *Veterinary Outlines,* from which they have borrowed unmercifully without acknowledging their obligation, and, in some instances, without even noticing the existence of the author or authority derived from.

The *practice* hereafter detailed was first formed on the principles I have recommended as guides to the practice of others: it has stood the test of a long and successful trial, subjected to the improvements of experience; and it is now, therefore, offered with confidence to others: and as long as it remains uncontradicted, I would invite the young practitioner to study it, and to follow it, until another presents itself in a higher degree worthy of his attention. That such may happen, I make no doubt; but if it do not occur till one more disinterestedly written than this appears, or with more zealous intentions for the advancement of the art, it will long remain without a competitor.

PART THE THIRD.

THE

Practice of Veterinary Medicine;

OR,

A DESCRIPTION

OF THE

CAUSES, SYMPTOMS, AND MEDICAL TREATMENT,

OF THE

DISEASES OF THE HORSE;

To which is added,

A more concise Account

OF THOSE OF

NEAT CATTLE AND SHEEP.

OF DISEASE GENERALLY.

DISEASE is a morbid affection of a part or of the whole of the body, whereby the exercise of some of its functions is altered or suspended. The *causes* of disease are various; some of them are evident, others we are entirely unacquainted with. We name these causes *remote*, or such as *predipose* a part or whole of the body to take on disease: thus peculiarity in conformation predisposes the body to various morbid attacks; as small carcassed horses are more peculiarly liable to diarrhœa, and dark chesnut horses to contracted feet. By entailing a particular conformation, hereditary aptitudes to diseases are occasioned; some breeds being predisposed to cataract, and others to broken wind. The *proximate*, the *exciting*, and the *occasional* causes are, in fact, the same; although it is attempted to give to the former a distinct meaning and character, as being itself the primum mobile and immediate agent; by which consideration it is made to be the effect, and not the cause. These exciting causes may be characterised as those immediately concerned in the production of the disease: a horse violently heated during hunting, plunges into a river, and pneumonia or inflammation of the lungs follows. Cold in this case is the occasional, the exciting, and, in fact, the proximate cause of the disease. Diseases were attributed for many centuries principally to an affection of the fluids or humours of the body, and thence it was termed the *humoral pathology*. In some instances this was ascribed to a *fluxion* or flow of some morbid fluid to a part, and in others to a *congestion* or total stoppage of the flow of the natural humours. Gradually, however, as anatomy and physiology shed their powerful lights over the subject, the solids were discovered to be also primarily affected, and more particularly the vascular system of the body. Boerhaave first conjectured that in fever the blood vessels themselves were somewhat affected, and that by such alteration the blood was obstructed in its attempts to circulate through them. Cullen still further extended the idea that the solids were active agents in disease, and that it was to a spasm of the extreme arteries that the fancied obstruction of the blood was attributable *. Diseases are varied, not only according to the immediate nature of the attack, but also of the part it operates on: thus staggers depends on increased action of the vessels of the brain; and enteritis on an inflammatory attack on the peritoneal coat of the intestines—as grease is a local affection of the integuments of the extremities, but the appearances or symptoms of which vary equally with the attack itself. Each disease also, though it afford some characters in common, yet presents individual peculiarities according to the state of the patient, his age, situation, &c. &c. If a lingering and debilitating disease attack an

* Hoffman, equally with Cullen, maintained the idea of spasm in the capillaries as the cause of fever.

emaciated animal, his death is almost certain; when one in full flesh and condition might readily withstand it. If a horse in low condition, or under the effect of the autumn constitutional change, be attacked with grease, the morbid symptoms rage with increased violence and obstinacy. Strangles is principally confined to a certain period of age; and ophthalmia is not common long after the adult period: while the situation of crowded cities renders horses peculiarly obnoxious to catarrh; as very hot climates inflicts the greater liability to tetanic attack.

The *systematic division of diseases* is termed *nosology;* the simplest arrangement of which is the alphabetical *. Antiently, diseases were divided according to their duration, and this laid the foundation for the *acute* and the *chronic;* but which subjected the founders to call in the aid of the *subacute*, for those which ranged in the intermediate spaces. It has also been attempted to arrange diseases simply according to the parts of the animal frame, which suits well with the plan of uniting the anatomical, physiological, and medical considerations together†. Modern nosology is principally built on the distinctive symptoms of diseases, united still more lately with doctrines drawn from an observance of the morbid actions of the vascular, nervous, and lymphatic systems. Linneus, Sauvages, and Cullen raised stupendous monuments of this description; the bases of which still serve for foundations for modern superstructures. In England no systematic arrangement of the diseases of the horse had been attempted, until the nosology which accompanied the first edition of the VETERINARY OUTLINES, the general correctness of which has never yet been questioned.

The division of diseases into epidemic, endemic, sporadic, and specific, is very generally admitted. *Epidemic diseases* are such as prevail generally at a particular time among all ages and kinds of horses; dependant probably on some outward causes operating on the systems generally of that class of animated nature. *Endemic diseases* are those peculiar to a particular climate or place, confining their effects principally to the animals inhabiting those parts: thus the malignant epidemic of horned cattle is principally a continental complaint. Altogether, however, endemic diseases are but few in brute subjects. *Sporadic diseases* stand in opposition to the two former, and form a very extensive class, comprehending all such as have a particular cause, and affect particular constitutions or ages: thus strangles becomes a sporadic disease to young horses; and the distemper a sporadic disease among

* In human pathology, Dr. Heberden's excellent nosology, founded on this plan, forms a prominent instance.

† The well-written lectures of Mr. Percivall, jun. afford an excellent illustration of this method of teaching the veterinary art; but however well calculated it may be to shew the writer's abilities to advantage, it is questionable how far it may prove the most eligible mode of teaching the art itself, in its present state at least, and among its present practitioners; when compared with the more regular and uniform division of subject according to the methods pursued by the best practical writers. Among our continental neighbours, nosological arrangements abound. Bourgelat, M. Vitet, La Fosse, &c. arranged the diseases of the horse, after various methods, into systems. Later professors have worked in the same field, and one of the last productions of this kind is the Esquisse de Nosographie Vétérinaire of M. Huzard, jun. which, it may be added, is a work of great merit, and highly creditable to its author, who kindly presented it to me.

young hounds. *Specific diseases* are such as are peculiar to a particular class of animals: thus farcy, glanders, and strangles, are among the specific diseases of the horse, as distemper, popularly so called, is one peculiar to dogs.

To a proper knowledge of the management of diseases, we consider the cause, symptoms, diagnosis, prognosis, and cure. The *cause* is frequently involved in obscurity; at others, by attention it may be discovered; and again, in some instances, it is evident at once. The *symptoms* of a disease are the immediate effects it produces; thus an inflamed brain, being productive of delirium and redness at the eyes, makes delirium and redness at the eyes a symptom of inflamed brain: but this does not take in any other than the immediate effect; for death is frequently a result of this disease, but death is not a symptom of an inflamed brain. From the symptoms, we form our *diagnostic* of the disease; that is, we judge of its present state: being masters of which we are enabled to form a *prognosis*, or opinion of its probable termination. The *cure* forms the most important part, and consists in an attempt at assisting Nature in her efforts to produce a natural remission of the disease. If these efforts are wanting, or inert, we promote an artificial one, or we attempt to resist the effects of the disease.

CLASS I.

DIFFUSED OR GENERAL INFLAMMATION.

INFLAMMATION is a subject of the greatest possible importance, whether we regard it as a disease, or as an active and necessary agent in the restoration of parts. It may be considered under the divisions of general or diffused inflammation, in which the heart and the whole of the vessels arising from it, participate primarily in the affection. Or it may be local or confined, when the blood vessels of a part only are affected with the inflammatory action. To the first of these we refer febrile affections, and extensive inflammations of vital organs, as well as symptomatic fever generally: and it is this part that more immediately concerns our present pathological purpose. Local inflammation appears more directly concerned with the surgical part, or that which treats on the structural derangements of the more external parts. The leading features of this important subject belong to both departments, and as such we shall give a summary of the whole, reserving the practical illustrations of local inflammation to another part of the work.

Inflammation may be considered as a disease of the blood vessels *,

* It has been before stated, that inflammation was formerly under the humoral pathology considered as dependant on a diseased state of the blood itself, but the impossibility of giving a rational explanation of the causes which produced it, or the phenomena which accompanied it, by any change in the blood itself, led physiologists to investigate the effects likely to be produced by an altered state of the blood vessels, and considering the blood itself to be unaltered. Upon this consideration of the subject the theory of inflammation is now formed; and as it is a most important subject to the veterinarian, and one on which the practice of his art must mainly hinge, he would do well to inform himself of the experiments made, the facts collated, and the reasonings deduced in support of the present doctrines, from the able works of John Hunter, Drs. C. Smith, Wilson Phillip, Hastings, Thompson, with those of Messrs. Burns, Allen, James, &c. &c. &c.

principally of the arterial ones; and thus in proportion as a part is more or less vascular, so is it prone to a more or less active inflammation: and perhaps it might not be an improper consideration of the subject to characterise inflammation as an increase of the powers of life as regards the circulatory action of its blood vessels*. Inflammation is characterised by heat, redness, tension, and pain. The increase of the temperature of an inflamed part will be found in every instance considerable†; and that usually in proportion to the degree of the inflammatory action. In the horse we cannot so readily detect the heightened colour of inflamed parts, from his exterior hairy covering; but when this is shaved off it is sufficiently evident, and in certain parts, as the conjunctive membrane of the eye, the mucous lining of the nostrils, and mouth, it is most easily observed. This effect we know to be occasioned by more red particles being circulated than natural in such parts, as usually carry red blood, and by red globules being forced into such vessels during the inflammatory state, as at other times carried only the colourless parts of the blood, as the transparent part of the eye, which under inflammation is therefore often seen bloodshot. The swelling of an inflamed part is effected at first by this increase to the capacity and distention of its vessels: afterwards it may be kept up or even enlarged by effusion of the contents of the vessels within it‡. The sensibility of an inflamed part is always

* In this way a stimulus applied to a part, as heat, friction, acrid matters, &c. increase the florid tinge, by determining more blood to the part. Its sensibility is likewise augmented, and its temperature is raised; and if it proceed further its bulk is likewise enlarged, producing all the phenomena of increased vital powers. M. Latta has however taught, and others have adopted the same opinion, that an inflamed part is not to be considered as possessing increased vitality or strength; but that, on the contrary, it is in a state of increased and acquired debility. It is not, however, probable that such is the immediate consequence: but it is more than probable that after some continuance of the inflammatory state, the action is carried beyond the powers of the vessels of the part, and that they become weakened in proportion as their contractility is exerted to overcome their distention. According to Dr. Thomson, the velocity of the blood in inflamed capillaries, sometimes continues from the commencement to the termination of that state; and that at others a diminished velocity in the circulation marks the rise, the progress, and the close of the inflammation; but that this latter state is much more common during the progress of the affection, than during its first stages.—(See *Thomson on Inflammation.*) Dr. Wilson Phillip says, "In short, inflammation seems to consist in the *debility* of the capillaries, followed by an increased action of the larger arteries."—(See *Dr. Phillip on the Vital Functions.*) It will thus be seen that the experiments made by Dr. Thomson and Dr. Wilson Phillip, to determine the contended point of increased or diminished strength in the capillaries, led to different results and conclusions, and that, unfortunately for the medical art, we are still somewhat in the dark on this interesting point: but as before stated, we are authorised from the best conducted experiments, as well as from the evidence of observation on the phenomena which occur, in concluding with Dr. Thomson, that under some circumstances the capillaries are in a state of increased action, and at others are affected with actual debility in inflammation.

† It is extraordinary that so accurate an observer as Mr. Hunter should have denied increase of temperature to an inflamed part, when the experience of every day demonstrates the contrary. From the time of Celsus, this has been universally admitted: "Notæ vero inflammationis sunt quatuor, rubor, et tumor, cum *calore* et dolore."—*Cels. lib.* 3, *chap.* 10.

‡ The water farcy of horses subjected to violent general inflammatory action is an instance of this, where the vessels pour out a serous fluid, which lodging in the interstices of the cellular membrane, occasions that dropsical pitting-in of the skin which is observable in such cases.

increased, but not uniformly in proportion to the degree of its vascularity; but it is in general dependent on the supply of nervous influence.

The divisions of inflammations are endless, some of which are useful and appear natural, as into *acute* and *chronic*. Very vascular parts have usually the former, which is commonly more quick in its progress and more favourable than in parts less vascular, as bones, ligaments, and tendons, in which the chronic or slow is apt to occur. This leads to a division also into the healthy and unhealthy inflammations. When a wound is inflicted into a muscular part, heat, swelling, and effusion quickly take place; the results of which are either immediate union, or granulations, which finally restore the parts; such is healthy inflammation. Tumours in other parts less organised, or under unfavourable circumstances, submit to many diseased changes of unhealthy inflammation. Inflammations are also called common, when only the ordinary processes go on; and specific, when the common phenomena are not observable, as in rheumatism, rabies, specific gastritis, &c. &c. It has also been attempted to divide inflammation according to its seat in elementary tissues*; from our observation that a difference in structure has a great effect, not only on the particular and general inflammatory phenomena, but also on their future effects and terminations. A still more general and characteristic division of inflammation is into *phlegmonous*, or the inflammatory affection of the skin and membranous parts, accompanied with heat, distention, redness, and an inclination to effusion when deep seated or extensive; and to suppuration when more superficial and circumscribed: and into the *erysipelatous*, which is seldom accompanied with much tension, is not uniformly red, is early attended with serous effusion in the form of small blisterings, and future desquamation. This kind of inflammation, when it is superficial, affects the skin; and when it is more internal, it confines itself to the surfaces of mucous membranes. With some subdivisions of each of these principals, a nosological arrangement of inflammations might be formed, at once comprehensive and satisfactory.

When the usual phenomena of inflammation have lasted a longer or shorter time according to their intensity, the parts they affect, or according to the age, constitution, and condition of the horse, another series of symptoms present themselves; and the inflammation terminates. These ordinary effects or terminations of inflammation, are resolution, adhesion, suppuration, ulceration, and gangrene. *Resolution* arises when the overcharged and distended vessels not having been excited either into effusion or suppuration, recover their proper calibre, leaving the texture and former state of the parts entire. To effect this termination the efforts of the veterinarian ought to be principally directed; and it will stimulate his efforts to know that this favourable termination may take place in whatever part of the body the affection is situated. *Adhesion*, or the adhesive state of inflammation, appears to be dependent on a disposition of the capillary arterial branches to pour out the coagulable parts of the blood: or, in other words, what has been known by the coagulable lymph, and which process may be healthy or diseased according to circumstances.—(See *Local Inflammation.*)

* This method of division is sanctioned by the names of Dr. C. Smith, Bichat, and Pinel.—See also observations on the different species of inflammation, by Mr. James, of Exeter, 1821

When the continuance of the inflammatory action prevents either of these effects, the general affection of the system becomes increased; the pain, which probably was before dull, becomes now darting and severe, and *suppuration* follows. These appearances are principally observed, when tumour forms, and the pus or matter is poured into a circumscribed cavity. When suppuration takes place on extensive mucous surfaces, the febrile symptoms are less, and the pus seems to be poured forth from the arteries with little or no abrasion or ulceration of substance. *Gangrene* occurs when the arterial action has been so extreme, as actually to produce death in the inflamed vessels by congestion and extravasation of the blood; which in these cases changes its red, for a yellowish brown tinge. The part affected also becomes livid, and from the mouths of the ruptured capillaries, a thin fœtid serum oozes in the form of small vesicles. The pain diminishes, the constitution sympathises, and universal debility succeeds.

In addition to the foregoing terminations, there is another that now and then takes place naturally; at other times it is brought about artificially. Two distinct inflammations are seldom found in parts situated near to each other: but a part in proximity may become susceptible of the increased action in a superior degree to the part first affected; in which case, as it takes on the inflammation, it very generally produces the effect of removing it from the other; and this termination is called *metastasis:* but as this is much more frequent in erysipelatous and arthritic inflammations, to which the horse is not very liable, so it is seldom that this termination takes place naturally in him; the most common instance, however, of this, is in what is termed moon blindness, wherein one eye will sometimes become suddenly well, and the other affected. But an artificial metastasis is frequently produced in the horse with the utmost benefit; thus, in a pneumonic state of the lungs, by raising an active inflammation on the sides of the chest externally, by fire, by caustic, or by blisters, many horses are saved; for a removal of the affection takes place from a part essential to life, and with which the system sympathises largely, to a part not essential to life, and with which the constitution does not so intimately sympathise; and which likewise is more able to bear it. The termination of inflammation in schirrus is not known in the horse, and the modification of this in indolent tumours is also not frequent, at least of those permanent ones approaching schirrus or steatomatus.

The liability to these various effects or terminations of inflammation, it has already been stated, is not equally distributed to all parts of the body; on the contrary, some are more prone to one set of inflammatory phenomena, and other parts to a different effect or termination. Deep seated parts and the great cavities of the body are more prone to the adhesive effects of inflammation, or to that variety of it which produces effusion. By the former, bands of coagulable lymph form adhesions in the chest and thicken the wind, or obstruct the trachea and produce roaring: by the latter, serous effusion takes place and produces dropsy. In mucous canals, and on mucous surfaces, the suppurative state of inflammation is most common. When the inflammatory action is still more violent, it frequently ends in gangrene; but it is seldom that suppuration takes place. In mucous canals and on mucous surfaces, on the contrary, suppuration most readily occurs; and as in parts supplied only with exhalant capillaries, ulceration and an abraded surface must accompany the formation of pus, as already noticed; it is here produced as a pure secretion from the surface without ulceration, because between the parts a great difference in structure exists. It is to this cause we attribute the tendency of the nasal membrane to produce pus in catarrh, strangles, and glanders, but very rarely to take on gangrene. If bone become injured, its inflammatory process is ulcerative, but slow; and granulations form very tardily; for its structure is but little vascular, compared with skin or muscle, which being torn off, inflames, granulates, and is reproduced quickly.

The *causes* of inflammation are said to be remote and proximate; but which distinctions are by no means easy to define. Such occasional causes as act by their outward effects as stimulants, whether they act chemically or mechanically, we can readily comprehend: but the more remote agencies of heat, cold, miasma, and deleterious gasses, we are at a loss to explain, and they may be proximate or remote causes according to circumstances. Inflammations local and confined, and febrile affections generally, were wont to be attributed principally to the effect of cold. Modern pathologists have been led to consider this as erroneous, and, on the contrary, they attribute more inflammatory affections to the alternation of heat with cold, than of cold with heat. But it is probable, that in attempting to prove too much, as is usually the case, they have proved little or nothing; for daily observation of plain facts convince us that the application of cold, under various forms and circumstances, is an active agent in the production both of general and of local inflammation*. The proximate cause of inflammation is defined to be the state of the vessels, and of the relations between them and the circulating blood within them†. This subject has been already discussed.

In inflammation, either some change actually takes place in the blood *per se*, or it is operated on by the vessels themselves. In gangrenous vessels, the fluid is altogether different from healthy blood; and in the more early stages, inflamed vessels operate some change on it, for they are found to retard its coagulation and augment its fluidity, by which means the red globules fall to the bottom of the blood drawn, and the

* On this subject Dr. Thomson most ingeniously remarks, that "No subject is more deserving of attention, than the effects which are produced in the human body by the operation of cold applied to its surface; but the subject is at the same time exceedingly extensive, complicated, and difficult. These effects differ according to the degree in which the cold is applied, the state of the system, the part of the body to which it is applied, and the mode of its application. So diversified, indeed, are these effects, that it requires no mean confidence in theoretical reasoning to believe, that the operation of cold in producing them is explicable upon any single general principle." (*Lectures on Inflammation*, p. 58.) If it were competent for me to form an opinion on the subject, it would be this, That there are states in the body, brought about by the agency of electricity, magnetism, and galvanism, singly or united; which operate some of the most surprising changes in the body, and give it aptitudes to be acted on by exterior circumstances, very different at some times to others. It is my opinion, that to this universal agency more of the phenomena of health and disease are attributable than to any other, and to most others united.

† Here an evident difficulty occurs: If the state of the vessels be an inflammatory one, Is inflammation a cause or an effect of this state? If it be a cause, it cannot be more proximate than that which promoted it, whether cold or other; if it be an effect, no cause need be assigned to it.

gluten or coagulable lymph, called the buff, appears on the top: and thus, when blood drawn exhibits a white surface, and sizy consistence, we say, there is an inflammatory state in that habit. (*See Pulse, p.* 153; *see also Nature and Properties of the Blood, p.* 258). In local inflammation the vessels of the affected part only are in this state, unless the part be of great magnitude or importance in the system; in which case general inflammation sometimes accompanies it; and this state is called symptomatic fever. *General inflammation* produces inflammatory fever: nevertheless, there appear states or circumstances in fever which are not dependent on increased action alone, and it is this *something* that forms the very great obscurity in our theory of fever, and which is, in fact, the very essence of the disease. Diffused inflammation, constituting fever, should be distinguished from simple increased action arising from the affection of particular parts: the former constitutes a disease; but the latter is merely symptomatic, and sometimes even a salutary effort. It may, however, in some cases, rise to such a height as to wear out the patient. Most extensive inflammatory actions in the horse proceed to their termination sooner than those of the human, which appears to arise from the greater quantity of muscular coat found in his arteries. This gives a peculiar character to inflammatory diseases in him, and renders it particularly necessary that no one should form either his diagnosis, or prognosis, on the doctrine of similar affections in the human. The *prognosis*, or the being able to give an opinion as to the probable effects or terminations of extensive inflammation, must be formed from an attentive observation of the foregoing circumstances; and this attention must of itself form the diagnosis. In resolution not only the affected parts return to their former state; but the system at large becomes less irritable, and the general circulation moderates, as is indicated by the pulse becoming soft and moderate, and which is particularly the case when the inflammatory state assumes the character of fever generally. When more local, the sensibility of the affected part, the redness and the tension, gradually subside. Effusion is indicated by a remission of the increased action, the pulse usually also becomes smaller; but if the effused fluid be considerable, the pulse may be observed to be likewise irregular: there is also frequently an obstruction to the functions of some of the organs in the neighbourhood of the effusion. When suppuration takes place, the symptoms of pain and irritation cease, the pulse becomes sensibly softer, and fluctuation soon follows. When gangrene follows inflammation, the pain likewise subsides, and the pulse becomes also softer; but it likewise becomes weaker, and general prostration takes place; and gangrene is particularly characterized by these effects taking place abruptly.

The *treatment of general or diffused inflammation.*—In attempting the reduction of diffused inflammation, whether existing in the specific form of inflammatory fever, or in that of the idiopathic inflammation of some vital and important organ, the first remedy usually employed is *bleeding*, because of all other remedies this tends most to lessen the morbid increase of circulation going on. In general inflammation it is prudent to abstract a large quantity of blood at once, and as quickly as possible, by making a large orifice, for reasons detailed in page 258; and if the state of the pulse and other appearances, as those of the blood drawn, &c.*, betoken a continuance of the undue arterial action, repeat the bleeding as long as the muscular strength continues unimpaired; and this more particularly if the horse be of due age, and in full condition; ever keeping in mind that one or two early and copious bleedings are more effectual in combating active inflammations, than numerous subsequent abstractions, which frequently weaken and impair the general strength, and thus often add to the disease. The practitioner must not, however, be betrayed into too indiscriminate a use of the lancet, in some specific affections of an inflammatory nature. The peritoneal inflammation of the bowels will bear repeated bleedings; but that which affects the villous surface must be repeated with caution. One bleeding is frequently useful in the early stages of catarrh, but more is seldom admissible: while the inflammatory attacks on the parenchyma of the lungs will bear numerous venæsections. When phlegmonous tumours are forming, and in strangles also, unless the symptomatic fever run very high, bleeding must be cautiously attempted. *Purgatives,* in the human subject, form the next active agent in combating arterial excitement; but there are peculiarities in the structure and functions of the horse, which render this less eligible than in man. To produce active purging in the horse, is a source of great irritation frequently, and one that calls forth more of the powers of the constitution, than under some circumstances can be spared. (*See Purgation; see also p.* 288). It also requires so much time to effect it, that our dependence on it is lessened. Nevertheless, we must not neglect attempting a soluble state of the bowels by such means as tend the least to irritate. In some cases, repeated small doses of aloes, in others, oil, neutral salts, &c. and in all bran mashes and warm water, are means within our power to effect the end without irritation; while other cases require a more active purgatory practice by the croton tiglium, or a full dose of aloes at once. *Diaphoretic* and *nauseating remedies* are available to the great end of combating arterial action. Antimonials given in sufficient doses, and repeated at proper intervals, have unquestionably a considerable power over the arterial system; and this without operating very sensibly, either in nauseating the stomach, or relaxing the skin; but apparently by a direct action on the heart and arteries, as soon as received into the circulation †. If the antimonial pow-

* It is not the buffy state of the blood drawn, neither is it the cupped appearance of the coagulum, from which criteria of the propriety of a repetition of the bleeding can be drawn only; but also from the adhesiveness and tenacity of the coagulum as a mass. However buffy the blood may remain, provided the coagulum be soft and easily broken, a continuance of bleeding will not be advisable.

† I am fully aware that I am combating the opinions of some of our best veterinarians, by recommending antimonials as active agents in lessening arterial action; but repeated direct experiments, united to twenty-five years' attentive observation, have convinced me of the fact; and I am borne out in the recommendation by the opinion also of many other ingenious and eminent veterinary practitioners, in whose practice antimonials become a powerful antifebrifuge remedy. (*See Professor Peal's excellent Work, p.* 83; *and Clark's Vet. Phar. p.* 28). With Mr. Youatt, than whom a more acute and observant practitioner does not exist, it continues, as ever, a favourite febrifuge. But while I steadily maintain my opinion of the utility of antimonials in veterinary medicine, candour obliges me to own that I have considerably altered my ideas on the subject of the capability of nauseating the horse beneficially, as an arterial sedative: and although my experience on the subject will not permit me to go to equal extent in my recom-

der be used, vulgarly called James's powder, it should be given as a ball twice a-day, in two dram doses. If the tartrite of antimony be used, it may be given in doses of a dram and a half three times a-day, dissolved in water, gruel, or other liquid menstrua. In diffused inflammation of long continuance, or when considerable weakness is becoming apparent, an excellent diaphoretic and arterial sedative will be found in the acetate of ammonia, and a still more excellent one in the acetated liquor of ammonia. *(See Vet. Pharm)*. Nauseating remedies are in some degree available in the horse, in lessening arterial action, and the pulse will be found to lessen under the action of all such agents as tend to produce this sensation in the stomach, of which there are many. *(See pl.* 269.) We have already had occasion to remark on the sympathising properties of the stomach: it is also to be recollected that, in turn, every part of the body likewise sympathises with that. The arterial system and the skin are more particularly under this influence; and, therefore, whatever nauseates the stomach, relaxes the skin and vascular system at large. But this effect so readily under our command in the human system, and in most quadrupeds also, is not, from structural speciality, so readily nor so eligibly exerted in the horse. It is true he may be nauseated; and during the effect, when confined within certain limits, the circulation will be diminished: but when the nausea is pushed into unavailing efforts to regurgitation, great irritation follows, and the pulse increases in frequency often; becoming intensely hard, and sometimes irregular also. Under such circumstances, I have seen profuse perspiration, which, in every instance, has left the animal greatly prostrated in strength. When, however, a nauseating effect is found to be readily excited, and without producing extreme distress (and these aptitudes are very different in different subjects), it may be advantageously brought in aid of the other means of attacking inflammation. It must, however, be kept in mind, that in any inflammatory attack of the stomach and bowels, it is wholly inadmissible. The articles which may be employed for this purpose are various. When purgation is required as one of the intentions of lowering arterial action, two drams of aloes, given every sixth hour until eight drams have been given, will often conveniently fulfil both intentions of nauseating and purging. In the same way I have employed, with great advantage, the sulphate of magnesia (Epsom salts), in doses of four or five ounces, every four or five hours, largely diluted, and this particularly where an irritable state of the bowels has forbidden the administration of aloes or other potent medicaments. The more active nauseants will be found among henbane (hyoscyamus), nightshade, (belladonna) wolfsbane, (aconitum) tobacco, (nicotiana) and the root of white hellebore (veratri album). Each of these, from my own experiments, I am enabled to state, will produce nausea, in repeated doses of fifteen to thirty grains. I have occasionally fluctuated between my opinions, not of the salutary effects of these various matters, but of the hurtful effects, for they will all produce injurious consequences, unless carefully watched. The white hellebore root, powdered, is employed for this purpose by many veterinarians, and it

mendation of its beneficial agency, I freely own it possesses much more than I formerly attributed to it, but still much less in many cases than others give it credit for.

finds a warm advocate in Mr. Percivall, who recommends it in doses of twenty grains, twice or thrice a-day, and asserts, but I think rather erroneously, that it is the only diaphoretic with which we are yet acquainted. *Diuretics* are also serviceable in allaying inflammatory action, under the cautions detailed in the article Diuretics. *Diluents* are also to be considered as assistant febrifuges. Warm water, hay tea, thin gruel, or linseed tea, in considerable quantities, promote diaphoresis and a soluble state of the bowels. As heat is known to increase arterial action, so a *cool temperature* is generally advisable in these cases, with a thorough access of fresh air. All exercise should be avoided, except such as the horse is inclined to take himself in a loose box: muscular action greatly increases the circulation. Stimulating articles, as spices, ale, &c. should be avoided, unless indicated by peculiar circumstances. Hot clothing also, and all general and local causes of irritation, ought to be guarded against. These form the more general indications of cure of diffused inflammation, in the form of general fever, and in that of internal and essential organs; and we shall now proceed to speak of the several kinds separately.

OF FEVER GENERALLY.

THE subject of fever is always an intricate one. Some ingenious practitioners do not even believe that it ever exists in the horse as an idiopathic, simple, or primary disease; but that all febrile complaints are in this animal symptomatic of a local inflammation of some important organ. That fever in the horse does very seldom exist as a primary affection, is certain; and that it still less frequently remains in an original idiopathic state, without being transferred to some one particular organ, is even more certain. Nevertheless, the attentive veterinarian, whose opportunities for observation are extensive, will now and then meet with cases, where what may be called the *specific nature of fever* is present*. To perfectly understand what is here intended, we must again refer to what has been said on the subject of general inflammation; where we have remarked, that 'there appear *states* or '*circumstances* in fever which are not dependent on increased action 'alone; and it is this *something* that forms the very great obscurity in 'our theory of fever, and which in fact constitutes the very essence of 'the disease.' (*Vid. p.* 383.) That fever is a disease *sui generis*, having a specific character not altogether dependent on the heightened action of the vascular system it creates, is pretty generally acknowledged, and tolerably easily proved: one very familiar instance seems to present itself. Pneumonia or inflammation of the lungs, even when very violent, and attended with alarming symptoms, does not produce so much absolute present prostration of strength in a horse, as an attack of epidemic catarrh, comparatively mild, and attended with little danger. The reason is, that, let the former be as violent as it will, it is still local inflammation, and attended only with increased action, being

* In the Nosographie Vétérinaire of M. Huzard, a detailed account of simple inflammatory fever appears; and, from the inquiries I made when on the Continent, I found this fever was generally described by all the continental Nosologists. Intermittent fever finds a place also in this Professor's work. He, however, acknowledges it to be extremely rare, but details a well marked case which occurred in the practice of M. Damoiseau, ex Véterinaire au Haras du Pin.

unaccompanied with other fever than that which we term symptomatic; and which is, as has been before said, a state dependent on the mere increased action of the blood vessels; and in fact may be rather considered as an effect than a cause. But, on the contrary, as in true or primary fever, one of its strongest characteristics is an early and universal muscular weakness; so in the epidemic catarrh, which is evidently a true febrile affection, having superadded the increased vascular action of an extensive surface of mucous membrane, a comparatively mild attack of it produces a more speedy and evident debility of the muscular powers, than a much more serious affection that is purely local; even though the symptomatic fever should be much higher than that of the epidemic.

It is also very common to deny the existence of a putrid tendency in the fevers of horses; or rather that any original disposition exists in the inflammatory affections of the horse to assume that type we characterize by the term typhus: but if it be granted that the horse is not wholly incapable of generating or receiving a disease having the specific character of fever (and from what has been brought in proof, I think it must readily be so); then, this being granted, it surely will be difficult to deny the putrid tendency of some of the fevers of horses; seeing that all fevers have many characters in common, and that from analogy it may be readily assumed, that the animal, who is liable to a mixed febrile complaint, such as we describe the fever of the horse to be, shall almost necessarily be subjected to that type of fever so little remote from it. But one fact is worth all the theory in the world: in proof, therefore, it may be added, that the observant practitioner need not be reminded, the epidemic catarrh frequently produces œdematous swellings along the chest and belly, or over the head, or around the joints. In some cases buboes exist, or very large glandular abscesses form: in others a sanious, stinking, and bloody ichor flows from the nose, and, in the end, the whole cellular membrane becomes suffused with a serous fluid termed water farcy. All these are common appearances, singly or conjointly, in aggravated cases of the epidemic catarrh; and are also now and then met with at the close of that fever which appeared to commence as an idiopathic affection. It may be, therefore, safely affirmed, that the unprejudiced observer, who has once only seen a horse sinking under a disease accompanied with the above appearances, will not hesitate to allow his being capable of becoming the subject of putrid fever. In the malignant epidemic that sometimes visits horned cattle, the putrid tendency is still more evident and notorious.

Under this view of the subject I shall proceed to describe the fevers of the horse into, first, Simple or Idiopathic fever. Secondly, Epidemic or Catarrhal fever. Thirdly, malignant Epidemic, or malignant Catarrhal fever. Fourthly, I shall observe upon the most common of the fevers of the horse, the Symptomatic, or that febrile appearance that accompanies great local affection or inflammation of some vital and important organ.

COMMON OR SIMPLE FEVER.

Latin Name. *Synochus.*] French Name. [*Fièvre inflammatoire.*

Pure fever is certainly a rare occurrence in the horse; but I am disposed to think, that it is not so much its extreme rarity which renders its existence disputed, as that his constitutional tendencies are such as seldom allow general fever to prevail in him, without a more active and local translation of the inflammation to some vital organ. Few practitioners have enjoyed more extensive opportunities for observation than Mons. Huzard, placed as he is immediately under his father in the direction of the great Veterinary College of Paris; and his known researches into every subject connected with the practice of veterinary medicine, stamp with no small authority what proceeds from his pen. On this subject we find, in his Esquisse de Nosographie Vétérinaire— "Cette affection (Fièvre inflammatoire simple) est commune au cheval, au bœuf et au chien, et elle débute dans ces trois animaux par des caractères à-peu-près semblables. Grand lassitude, pesanteur de tête perle de l'appétit, température de la peau plus élevée, chaleur de l'air expiré plus grande, pouls plus fort, plus fréquent, plus vite, rougeur des membranes muqueuses, larmoiement. Dans le chien, halètement sans cause; dans le bœuf, sécheresse du mufle et chaleur des oreilles et des cornes. Elle reconnaît pour cause, des fatigues trop fortes, des alimens trop stimulans; quelquefois dans le cheval, un repos trop prolongé. Cette maladie, d'abord générale à toute l'économie, se termine souvent par resolution, mais dégénère aussi en affection locale; et se change en affection inflammatoire, soit des poumons, soit de quelques parties musculaires, soit enfin, et plus souvent dans le cheval, et inflammation du tissu réticulaire du sabot."

In my own practice I have certainly met with this fever; and I am convinced that many inflammations of vital organs begin by an attack, not local, and confined to that immediate part, but by one which exists, in the first instance, as a general diffused inflammatory action of the vascular system at large. Every practitioner is aware that it is a common practice, when a horse is observed at the very first approach of illness, to rouse him by various means. Among horse-dealers and jobmen, when the epidemic of the spring is prevalent, it is the custom to watch their horses narrowly, and to pursue some plan of this kind promptly; after which they frequently observe no more of the complaint: but if the first cold fit be passed over without attention, a hot stage generally succeeds; in due time the horse again shivers, his hair stares, and he becomes subjected to other symptoms of illness, and the disease is then fully formed. The means pursued for this end are various, but they are all such as tend to rouse the flagging powers, during the cold fit, into increased action, and into such a degree of it, as considerably to overbalance the increased vascular action produced by the morbid attack, as shall be greater than the increased action of the complaint: and it is upon justly appreciating the two degrees of action, and upon pitting the forced one against the diseased one in sufficient strength, that the salutary effort consists*. Now, were such a plan to be put into practice, when a topical inflammation of some important and vital organ had actually taken place, it would most undoubtedly greatly aggravate it: but as in diffused inflammatory action, constituting fever, there is a *specific* character, not wholly dependent on the increase of the vascular power; so the production of an artificial action, greater than the diseased one, in the early stage, will sometimes overcome the febrile one. I think this a sufficient proof that the inflammatory complaints of horses sometimes originate from true fever, translated afterwards from an universal to a particular affection.

The proximate cause of this fever, to speak in the customary phraseology, is usually to be found in the plethoric state of the habit in general. The remote causes are probably various. Full feeding, without corresponding exercise; sudden alterations from a low to a full diet; excessive fatigue; great and sudden changes of temperature, may, any or all of them, tend to this: long deprivation likewise from either food or water, particularly the former, may bring it on; but an alternation of cold with heat is certainly the most common of the exciting causes of this as well as of most of the inflammatory attacks of the horse. The vessels of the skin seem in these cases to be first acted on, and probably it is the reaction of the heart and arteries upon this state that constitutes the primary attack; the keeping up of this reaction is probably dependent on the *specific* nature of the complaint.

The *Symptoms* that present themselves are, first, a shivering fit, in which the skin is corrugated, and shakes violently; the hair stares, and the legs, ears, and muzzle, feel intensely cold, all which last a longer or shorter period according to the violence of the attack, &c. To these some degree of heat succeeds, and the horse resumes nearly his usual habits; until the second cold fit occurs, after which the pulse becomes increased in frequency and fulness. The skin is found alternately hot and cold, with occasional partial sweatings; the bowels rumble, and are flatulent, and general uneasiness, without acute pain, is manifested, by restlessness, and frequent shifting of position. The inner surface of the eyelids and nostrils is slightly increased in redness; thirst is present, and costiveness is also common, but the respiration is not greatly accelerated.

* During the memorable expedition to the Helder, under Sir Ralph Abercrombie, I was stationed in the advanced lines as Surgeon to the second battalion of the 40th Regiment. The troops so stationed were usually under arms every morning by break of day, to prevent surprise; and, in that unhealthy country, the standing exposed for two or three hours was found to occasion many intermittent attacks; thefirst rigors of which always took place while thus standing unemployed. At first, when such an attack took place, the man was ordered out and retired, and, on my seeing him afterwards, the disease was formed, and usually ran through its course. This began to be so frequent, that our ranks were likely to be thinned, and I resolved on attempting at prevention in preference to cure. In future, therefore, whenever a man began to complain, I was instantly informed of it; and, instead of allowing him to retire, I gave him on the spot from two to three grains of opium, nipped from off a piece I kept in my pocket for the express purpose. I then ordered him to be walked briskly for half an hour between two men, and afterwards to fall into the ranks again. So efficacious was this plan of combating the incipient disease, by a stimulant greater than the morbid one, that not one in ten of those in future attacked on the spot had occasion for medical assistance afterwards.

Such is usually the first stage of simple fever, as I have observed it, and thus much of it, I conceive, occurs more frequently than is generally supposed; but it is very common for it at this time to sink its specific character of true fever into a local attack on some particular organ, as the brain, lungs, bowels, kidnies, and not unfrequently to the feet. Under any of these circumstances, the primary character of fever is lost, and the remaining febrile symptoms become secondary and symptomatic. The preference it may have in these instances for any one organ over another, is not easily accounted for; but it may be connected with local circumstances, particularly with such as have had a tendency to produce an unusual determination of blood to a part. Violent and long-continued exercise is observed to give this disposition to the lungs, from the very great quantity of blood forced through them during exertion. Water, thrown over a horse when hot, is very apt, by checking perspiration, to bring on a state of the bowels, or of other viscera, predisposing them to inflame. A heavy and awkward rider, travelling a great distance, subjects the kidnies to such injury, that they often require but little additional stimulus to take on nephritis: and it is equally notorious, that severe riding in the snow, or the custom of washing the feet when a horse is very hot, particularly in frosty weather, will produce, by re-action, a determination of blood to these parts, which a febrile irritation, the consequence of severe exercise, and injudicious management, may, by translation, be converted into acute founder, and such appears the origin of many acute foundered cases. It remains to be noticed, that, independent of these purely local attacks, there is great reason to believe that this fever not unfrequently degenerates into the catarrhal epidemic; and I am inclined to think, that many of those cases which commence by a simple rigor, and which are often prevented from proceeding farther by simply overcoming this, are of this nature.

But should none of these attacks occur, but, on the contrary, should this fever remain, after the first stage, purely idiopathic, which, though very seldom, does now and then happen, a series of symptoms supervene seldom invariably the same in any two subjects, but with sufficient general characters to describe them as follows:—The pulse continues to have a corded feel, but loses still more of its fulness, and increases in quickness; the skin also becomes moist, the eyes weep, and appear red and inflamed; and while the nose secretes a thin acrid fluid, the mouth is usually hot and dry. The urine at first is gradually secreted in larger quantities, and becomes of an opaque colour. It is not unusual, also, for the hind legs to swell, and sometimes likewise serous deposits take place about the head, the throat, or along the chest and belly; and when these occur early in the complaint, I should consider them, in this as in the epidemic catarrh, rather as favourable indications: that is, I have found the irritative fevers of the horse, so accompanied, more tractable than others without: but I think I have observed the reverse of this to be the case in the fevers of horned cattle.

What I have just described may be considered as constituting the middle and principal stage of this fever, to which, under favourable circumstances, there succeeds a softer and less frequent pulse; the countenance looks more lively; and although the muscular weakness rather increases, the irritability lessens; the secretions also return to their natural state; the mouth feels cool and moist, and the heat of the body becomes lessened, as well as regular and equable throughout; slight symptoms of returning appetite likewise appear: under which circumstances, a resolution of the fever is formed. An unfavourable termination I have never seen, and consequently I cannot describe the more mortal symptoms.

Prognosis.—This must be formed from the degree of inflammatory diathesis manifested in the first instance; the disposition of it to lessen or to increase in the second stage; the age, constitution, and condition of the individual attacked being taken into the account.

The Treatment of Simple Fever.—It has been before remarked, that if the first rigor be observed, and artificial means be judiciously used to overcome it, by rousing the flagging powers when under the influence of the cold fit, that the specific morbid action will sometimes at once give place to the one artificially excited, and the future progress of the disease will be completely arrested. It is but seldom, however, that sufficient attention is paid to detect the febrile attack at its outset; and without it be thus attended to during the first cold fit, it would be useless, and even worse than useless, to attempt any thing of this kind afterwards. But when one case has already occurred, and as others become attacked in a similar manner, it may happen that the attendants may notice the commencement of future instances; so for the benefit of which cases it may be proper to point out the means that may be safely used. The instant the cold fit is observed, clothe the horse warmly, and immediately take him out and trot him briskly for ten minutes only; when brought again into the stable, hand rub him well over by the assistance of two or three persons: having done which, give the following, with half a pint of ale:—

Nitrous æther *(sweet spirit of nitre)*	one ounce
Acetated liquor of ammonia *(Mindererus's spirit)*	six ounces

Or,

Carbonated ammonia *(spirit of hartshorn)*	six drams
Warm ale	a pint.

In spite of this preventive treatment, if the rigor continue its course, and a hot fit succeed to this, with the additional symptoms detailed also; then proceed to treat as directed under Diffused Inflammation. More minute practical particulars may be readily gained from the treatment of the remaining febrile affections of the horse.

INFLAMMATORY FEVER IN NEAT CATTLE.

Oxen and cows are subject to a highly inflammatory fever which usually terminates by a critical deposit on some part or parts. This complaint is known to farriers, cowleeches, and graziers, by the various names of *Black quarter; Joint felon; Quarter evil; Quarter ill; Shewt of blood; Joint murrain; Striking in of the blood;* and *Black leg*. It is more common among two or three year old cattle than those of any other ages. Any cause producing an inflammatory diathesis will occasion it: among the most frequent is a change of food from a meagre to a more nutritious one, and hence it is very common among the droves brought from the north into the luxurious pastures of the southern, midland, and western districts. It is sudden in its attack, and rapid in its progress, presenting highly inflammatory appearances at first, which as quickly degenerate into a low and putrid type; as indeed do most of the inflammatory affections of neat cattle and sheep. The first symptom usually betrayed is a dull heavy countenance, with red eyelids and nostrils, a pulse quick and hard; the dung being either retained altogether, or hardened and in small quantities. The appetite fails, and the animal is sometimes drowsy, but more often is subject to increased watchfulness. On the second or third day a critical deposit takes place, which terminates the inflammatory action. This deposit, in some, proves an universal diffusion of bloody serum throughout the cellular membrane; in others, inflammatory phlegmonous tumours form on the joints, or on the back or belly. From the putrid tendency in the complaint, a quantity of gas is likewise let loose within the cellular membrane in some instances, which produces a crepitation or crackling under the skin, similar to that which appears in veal when blown up by butchers. Under these appearances, unless speedily relieved, the animal sinks; and it may be remarked, that after the critical deposits have formed, the disease usually assumes a more putrid type, and proceeds in its malignity in the same degree of rapidity that the early stage ran in inflammatory action.

The Treatment.—When the disease is detected before the skin crepitates, or before swellings have formed, bleed freely to the amount of three quarts, and immediately give a brisk purge: but, if the critical deposits have been made, be more sparing of the lancet, and also of the purging, unless the pulse should still remain very full and strong, in which case the purge may be administered; and when that has operated, proceed to give the following night and morning:—

Nitrous æther (*sweet spirit of nitre*)	an ounce
Acetated liquor of ammonia (*Mindererus's spirit*)	six ounces
Strong decoction of camomile	six ounces;

Or,

Beer yeast	six ounces
Powdered charcoal	an ounce
Ale or cider	half a pint.

The swellings may also be rubbed with yeast or beer grounds; but the puncturing of the emphysematous tumors, unless they be enormously large, is not to be advised.

INFLAMMATORY FEVER IN SHEEP.

Sheep fever, *Higham striking*, or *Blood striking*, are all names used to characterize a sudden diffused inflammatory attack to which these valuable animals are liable. The *treatment* in nowise differs from that of neat cattle, making allowance in the proportions of the medicaments for the different proportions in bulk and strength of the animals.

THE EPIDEMIC CATARRHAL FEVER.

Catarrhus.] [Courbature, Morfondure.

The catarrhal fever, which is also popularly called *Distemper*, attacks horses at any time, and almost under any circumstance; but it is infinitely more prevalent at some times, and under some circumstances, than at others. No age is exempt from it, but the number of young subjects attacked is much greater than that of older ones. The horses of large cities and crowded towns are also more obnoxious to it than those less confined. Occasionally, however, it rages in a truly epidemic form, when the liability to its attack is almost uniform among all varieties, with the exception, that, even under this state, young subjects, and those newly brought into stable management, are more liable to it than the older and trained horses. The spring months appear particularly favourable to its production, and the prevalence is materially increased by a variable state of the atmosphere, as great and sudden changes from dry to wet, from heat to cold, and still more certainly if accompanied with a long continued easterly wind. Now and then it is found to occur in wet autumns also. It has been disputed whether it be contagious or not, and this point is by no means easy to decide. When the disease is generated from the mere application of cold or moisture, it appears but little contagious; but when it rages as an epidemic, and is universally prevalent, it then certainly appears to exhibit contagious characters *. Our older farriers formed very erroneous conceptions concerning it, and also frequently confounded it with a disease known by the French under the term *courbature*, or *chest founder;* which, in some instances, was a rheumatic attack of the scapulary and intercostal muscles; and in others an inflammation of the feet. The old French farriers fell into the same error; and even the more early ones of the reformed school have confounded it with pneumonia †; and although its causes, symptoms, and terminations are now as well known there as here, yet the French writers are so fond of wire-drawn divisions of their diseases, that we still find catarrh split into nasal, bronchial, pulmonary, and bastard strangles. With us also it is yet frequently confounded with pneumonia, or idiopathic inflammation of the lungs. Nor is the mistake to be won-

* It is not considered as epidemic or contagious by many veterinarians, and the circumstance of so many aged horses escaping it when fully within the sphere of its action, would seem to contravene the opinion that it is so, and to encourage a conclusion that it owes its contagious character more to the force and extent of the predisposition generated by a variable atmosphere, than to any morbid infection. Mr. Wilkinson, of Newcastle, who appears to have seen a good deal of it, however, describes it as decidedly contagious, and marks the differences between the two on the frame. Gibson, who gives a very excellent account of its ravages in London in the year 1732, said it then proved itself decidedly contagious. His description of the symptoms exactly agrees with those we have detailed. He found benefit from bleeding when the irritative febrile symptoms ran high; neither did he find that such a plan stopped the purulent secretion, but, as he thinks, rather prevented it running into gangrene. In 1734, we learn from him that it appeared again, and was accompanied with vesicular eruptions over the body, and which are, he observes, peculiar to the catarrh in the *epidemic* form. Osmer is no less particular in his description of it, as it raged in 1750 as an *epidemic*, as he observes. He advises bleeding in the early and highly inflammatory stages: in all others, he observes, it does harm.

† La courbature est a peu près la même maladie que la pleuresie: c'est une inflammation du poumon, causée par une fatigue outrée, ou un travail forcé. Le cheval a une fièvre considérable, tient la tête basse, est dégoûté, respire avec peine, tousse et jette par le nez une humeur glarieuse, quelquefois jaunâtre, quelquefois sanguinolente. On donne quelquefois le nom de courbature à une fatigue ou lassitude simple; mais ce n'est pas ce que j'entends ici.—*La Fosse; Dict. d'Hippiatrique.*

dered at in those of moderate experience, from the circumstance of these diseases owning some symptoms in common; and, in fact, from its frequently terminating in that complaint.

It is however of great consequence to distinguish it from simple inflammation of the lungs; as, from what follows, it will be found that there are some important differences to be pursued in the treatment; for, in the catarrhal fever, if the bleeding and other parts of the depleting system be carried too far, the consequences are pernicious; while, on the contrary, in pneumonia this plan, particularly in the early stage, can hardly be prosecuted too vigorously. To an attentive observer, such a mistake is not likely to happen; many circumstances will present themselves, as the early defluxion from the nose in catarrh, and its tendency to become purulent, the tenderness and swelling of the submaxillary glands, and the early prostration of strength which appears in it, compared with the violence of the other febrile symptoms. In catarrh, the pulse also is usually one which characterizes irritative fever; while in pneumonia it is usually oppressed, and, when examined at the heart, it is almost indistinct.

Catarrhal symptoms.—The disease usually commences with a rigor, or shivering fit, but which is frequently not observed: to this succeeds a defluxion from one or both nostrils, at first of a thin and serous nature; the eyes also appear heavy, red, and moist. The serous exudation from the linings of the nose, however, soon loses its thin, watery character, and becomes mixed with flaky coagula from the Schneiderian membrane; and if an early resolution of the inflammation does not take place, the suppurative process next succeeds, and the discharge becomes purulent. The general tendency in mucous surfaces in continuity, and even in contiguity, to become similarly affected, extends the inflammation into the pharynx and larynx, from which the tonsils frequently become tumefied and tender. Sore throat is therefore a very frequent accompaniment to the complaint, and which shews itself by a difficulty in swallowing water, which is rather sucked than gulped. The food also is chewed, or "*quidded,*" as it is termed, and then thrown out of the mouth. The inflammation extending itself throughout the larynx makes cough a usual symptom also, and which is more harsh, dry, and frequent, as the inflammation passes the rima glottis and enters the trachea, or less so when it confines itself to the larynx alone. From the tumefaction about the rima glottis, the cough is sometimes so painful as to occasion impatience and stamping in the horse during his cough, which is deep and sonorous. When the inflammation extends itself into the parenchyma of the lungs, pneumonic symptoms, as oppressed pulse, and intensely red nasal linings, are added to the catarrhal affection. The *leading characters* of the complaint, which seem to consist in an inflammatory attack on the secreting mucous membranes of the head and throat, give a tendency in the neighbouring parts also, concerned in other secretions, to participate in the same inflammation, which cannot but be considered as of a specific and peculiar kind. Thus it is very common for the maxillary glands to become tender and tumid, and not unfrequently the parotids also. The same tendency likewise produces phlegmonous tumours, which sometimes form in various parts of the head, and greatly protract the disease. In some instances also, swellings appear on the chest, belly, or legs, but these seldom prove critical, and terminate the disease. Neither do they, when they do not suppurate, aggravate it; on the contrary, I have remarked, that when they appeared early, they formed rather a favourable prognostic than otherwise. As it is at the first, so it continues to be accompanied with general irritative fever, which shews itself by listlessness and lassitude, loss of appetite, somewhat quickened breathing, and a pulse accelerated to near 60, and sometimes to more: but, unless the fever be unusually great, the pulse is seldom very full, or very hard. A remarkable prostration of strength soon follows the formation of the fever, and the suppurative process. Thus, about the third or fourth day, the horse, on being moved from his stall or box, will usually be found much weaker than the violence of the accompanying symptoms would give reason to expect. This is so generally observed, that the attendant debility alone is a marked characteristic of the disease.

About this time, if the complaint be mild, and if the treatment have been judicious, although the purulent discharge may rather increase than diminish, yet the severity of the other symptoms may be expected to abate. The cough and soreness of throat will lessen, the pulse moderate, the heat of the body will become equable, the countenance more lively, and the horse will now probably be disposed to eat some favourite food. The dung, which has been before dry and in small quantities, and the urine, which has been also spare and high coloured, return to their natural states, and the horse recovers gradually, but seldom rapidly.

The complaint however does not always take this favourable turn; on the contrary, by injudicious treatment, or by the violence of the attack, or by a translation of the inflammatory action, the respiration sometimes becomes greatly disturbed, occasioning much heaving at the flanks; the legs, ears, and muzzle become cold, the pulse is found greatly quickened, and the weakness to be increased. The nasal membranes now often look in some parts livid, and in others of a fiery red: the discharge from them also is tinged with streaks of blood. In these cases, unless relief be speedily obtained, the pulse will proceed to falter, cold sweats will appear, and the animal will often sink on the fifth, sixth, or seventh day. In other cases, these fatal symptoms are not so rapid; but, eventually, the horse becomes tabid, and dies after ten, twelve, or fourteen days. Not unfrequently also, when the inflammation has extended to the lungs, serous effusion takes place, as in pneumonia, and suffocation closes the scene. In some instances a partial recovery takes place, but the horse remains thick winded, or he proves a roarer, or the disease blocks up the air cells, and he becomes altogether broken winded. See these terminations fully detailed in Pneumonia.

Causes.—These have been described as principally dependent on a variable state of the atmosphere, acting upon a peculiar liability or aptitude in the constitution to become affected; more particularly at the vernal and autumnal equinoxes. In some years, this liability is more general than in others, and if to these be added an unusually variable temperature, with atmospheric moisture, the disease assumes a severer and more epidemic type. In such seasons it is that catarrh puts on appearances which has gained it the character of contagious also.

Prognosis.—This must be drawn from the mildness or violence of the general symptoms, as the quickness or moderation of the pulse, the state of the breathing, the early and kindly discharge of a moderate quantity of healthy purulent matter from the nose. When the patient coughs strong and without much distress, eats moderately, and remains tolerably free from weakness, there is little danger: but if, on the contrary, the local and constitutional symptoms are inordinate, and the prostration of strength very great, particularly when these are protracted beyond the fifth day, the danger is considerable.

Treatment of the Epidemic or Catarrhal Fever.—According to the degree of violence exhibited by the symptoms, so must the treatment correspond in activity; and before this is detailed, it is proper to remark, that when a cold fit immediately precedes the attack, and is detected, if any stimulant be given sufficiently strong to overcome the irritation already produced, that in such case the complaint will frequently make no further progress. The means whereby this may be effected are detailed in the treatment of simple fever. But when the cold fit has once given place to the hot fit, the disease may be considered as formed; and then to give stimulants would greatly aggravate it. The treatment in catarrhal cases must be begun by bleeding to the amount of two, three, or four quarts, according to the age, size, and condition of the subject; but should a practitioner be called to a case of this kind the third or fourth day from the attack, he ought well to examine the state of the pulse before he proceeds to bleed. It would also be prudent to examine the general strength of the patient by walking him out a few paces; for if the pulse, though quick, should be small, and the horse stagger in his gait when taken out, particularly should he be a young one, then by no means draw blood. But otherwise, when called early in the complaint, bleed to the amount mentioned; and, unless urged to it by certain appearances in the blood drawn, or by any rational fears of topical affection of the chest, or that the febrile symptoms remain very strong, and the pulse does not become softer and less frequent; unless any, or all, of these circumstances urge it, do not repeat the bleeding; but should the existence of any of these render it necessary, then repeat it to the amount of two-thirds of the original quantity only. After this, back rake, and open the body by laxative clysters (see *Materia Medica)*, and bran mashes; and if these do not succeed, give some laxatives by the mouth also (see *Laxatives, Mat. Med.)*, but avoid actively purging the horse, and proceed to give the following ball twice a-day.

No. 1.—Tartarised antimony *(emetic tartar)*	two drams
Nitrated potash *(nitre)*	three drams
Supertartrate of potash *(cream of tartar)*..	two drams
Honey, sufficient to make a ball.	

But when the cough is painful, or when the throat is too sore to admit a ball, then the following drink may be substituted with advantage, and may be repeated twice or three times a-day, according to the urgency of the symptoms:

No. 2.—Tartarised antimony *(emetic tartar)*	two drams
Nitrated potash *(nitre)*	three drams
Simple oxymel (see *Mat. Med.*)	four ounces.

First dissolve the tartarised antimony and nitrate of potash in six ounces of warm water, and then add the oxymel. Should any symptoms of pneumonia appear, the treatment must, of course, be varied; but otherwise, the strength of the animal should be kept up by horning down linseed tea or gruel, in case nutriment is not willingly taken; and when the debility is extreme, gruel should be thrown up as clysters also. Chilled water should be frequently offered the horse, and it should be placed nearly on a level with his breast, and suffered to remain so, the soreness of the throat often preventing the horse from stooping, though he might otherwise be inclined to drink. Malt mashes may also be given as soon as the debility becomes apparent; and from the first attack, green meat, if it can be procured, is desirable. Hand-feeding with choice picked hay (clover hay will be often preferred) will entice such a horse frequently to eat. When the sore throat is a predominating symptom, apply a mild blistering application to it, and do the same also to the tumified submaxillary glands, or the parotids when similarly affected. The infusum lyttæ, or mild sweating blister as it is called, will prove a convenient application for this purpose (see *Mat. Med.)*. Early in the complaint, when perfect resolution cannot be procured, proceed to assist the maturative process, to which end warmth tends; as one means to apply which, a warm mash should be constantly kept in the manger, or, what would be much better, to hang it to the head by means of a nose bag, the mash being put in hot, and renewed every four hours, which will greatly tend to bring the vessels to a suppurative process, and thus terminate the inflammation, and prevent the throwing out of coagulable lympth either in the trachea or bronchia; which should be, to the practitioner, a desideratum of the utmost consequence: for, if catarrhal fever be early brought to discharge by the nose, and if such discharge be kept up without check from cold, the disease will rarely terminate in broken wind, thick wind, or chronic cough. This early discharge will be likewise promoted by clothing the head in a woollen hood; the body should also be tolerably warmly clothed, and the legs ought to be watched, and should they become cold, they should be hand-rubbed and wrapped round with flannel or haybands. In fact, I think genial warmth more necessary in this complaint than in any other of the inflammatory affections to which the horse is liable: and in this, as in every other fever of the horse, an open airy box, or at least a loose stall, is of great consequence. When the former is to be had, no other exercise is required than that which the sick animal will take himself; for in walking horses out who are labouring under active illness, it should be remembered that exercise hurries respiration, and thus increases the circulation. If the disease assume a still more malignant turn, treat as detailed under the next head.

Besides the terminations already stated, catarrh has been found to degenerate into a chronic form; the mucous membranes affected with the specific inflammation have engendered an irritable habit, and they have been found to continue on every exertion to throw off purulent matter by the nose, and sometimes abscesses continue to form about the head. In all these cases, insert a seton or two in the jaws, stable soil the horse, and give tonic remedies (see *Mat. Med.)*. Catarrh, long protracted, has also ended in founder, which probably arises from the pressure of long standing producing congestion in the feet.

Neat cattle and sheep are affected occasionally with catarrhal fever, in both of which it produces symptoms and effects similar to those of horses. Neither does the treatment differ, allowing for the peculiarities of the animal in point of situation, structure, and bulk, which renders one quarter of the dose (of antimonials less) prescribed for the horse proper for a sheep, and two thirds for an ox or cow.

MALIGNANT EPIDEMIC FEVER.

Typhus Gravior.] [Maladie Epidémique.

It has been doubted whether horses are subject to putrid fever; but whoever has observed a horse apparently first attacked with the mild or common epidemic, which then proceeded through all the stages of morbid debility to throw out the most fœtid sanies from the nose; the stools, and all the secretions betraying the same fœtor; and, at last, the whole cellular membrane becoming affected with serous effusion, termed water farcy; cannot then doubt the existence of a putrid affection in this animal. Among neat cattle its ravages are too notorious, and its characters too well marked, to need argument; and it may be also considered as a full proof of the liability of the horse to the same, that during the ravages of the malignant epidemic among cattle, horses have also become affected; though it must be allowed that this has but seldom taken place, and, on the contrary, in some seasons there has been undoubted evidence that horses have fed and housed among infected kine with impunity. But that, not only does the horse generate and produce this epidemic with a true malignant character in his own person, but that he does also now and then receive it by the medium of affected cattle, there is full proof. All the French veterinary authors describe this disease. Bourgelat treats largely on it; and La Fosse, among other symptoms of putridity, notices the existence of aphthæ or thrush throughout the mouth, throat, and alimentary canal. Other authors, likewise, mention an epidemic among horses, accompanied with a phlegmonous tumour, similar to the human anthrax, which did not proceed to suppuration, but fell immediately into gangrene. Lancisi, an Italian veterinary writer, describes a putrid epidemic that destroyed many horses in that country in 1712. Osmer also, a well-known English veterinarian, notices an epidemic among horses, that had evidently some putrid appearances, and was undoubtedly of a malignant kind, from what he terms the critical abscesses, and which distemper, he says, had raged for more than fifty years, at different periods *. It appears to have been known also to the antients, and we learn from antient history, that they were in the habits of sacrificing to their deities to avert the calamity. Franciscus Fantasti, and John Baptist Mazzini, who have written *De Peste Boum*, inform us, that the horses of their country became, in like manner,

* Memoire sur une épizootie qui se manifesta sur les chevaux du dépôt du 20e régiment de chasseurs, en garrison á Metz; suivi d'un aperçu de celle qui a régné en l'an 2 sur les bêtes à cornes de la commune de Tramois; par J. B. Gohier, Lyon.

infected with it; and from whence, we are told, they inferred that the contagion of one kind of animal could excite a similar diseased action in another of a different kind; and of which we have, in fact, other instances, as the grease of horses will inoculate the teats of the cow, who, in return, will taint the milker's hand. The rabid dog gives his mortal malady to all around him, &c. &c.

Symptoms.—The malignant epidemic of horses always commences by similar appearances to those which characterise the mild epidemic: in fact, there is every reason to suppose that, in many cases, the one is only a heightened degree of the other, pushed into a putrid type by the violence of its action; but at some times, we have reason to be lieve it has raged as a malignant disease altogether, *sui generis*, though, fortunately, it has been but seldom. In the malignant kind, in addition to the symptoms accompanying common catarrh, purging is usually present, and a bloody stinking discharge from the nose also; the breath is likewise fœtid, the pulse quick, small, and wavering, and the weakness extreme.

Treatment.—Whenever the common epidemic rages with peculiar violence, still more caution ought to be observed with regard to bleeding; but a laxative should never be omitted; and as soon as any appearances of malignity present themselves, the most active means must be employed to support the strength, and destroy the putrid tendency. The temperature around should be rendered cool, and fumigations of hot vinegar frequently used; perhaps even a vinegar bath might do good. Green meat should be given, malt mashes also, and nutritious clysters; and when the weakness is very great, or the appearances of putridity alarming, give port wine, ale, or cider, and in case of diarrhœa throw up starch clysters. The following may be administered every four hours:—

Nitrous æther (*sweet spirit of nitre*)	half an ounce
Mindererus's spirit (see *Mat. Med.*)..........	four ounces
Infusion of camomile	six ounces
Beer yeast	six ounces
Tincture of opium..	three drams.

Mix.

To this, in case of necessity, may be added two ounces of Peruvian, oak, or willow bark.

THE MALIGNANT EPIDEMIC FEVER IN NEAT CATTLE.

The *distemper*, *murrain*, or *pest*, among cattle, has at various times proved a terrible scourge to the agricultural interest, and, indeed, to the world at large. We gather from history, that the *malignant epidemic* was not unknown to the antients; and the ravages it committed among their cattle were such as to induce them to make solemn fasts to appease the divine wrath and avert the calamity; and though it is probable it has appeared more or less in every succeeding age, yet among the moderns but little was written on the subject before the beginning of the eighteenth century, during the first half of which it became very prevalent on the Continent. In 1757, it gave Britain also a very heavy visitation, before which it seems not to have been much known in this kingdom. In 1710, 1711, 1712, and 1713, it raged among neat cattle throughout Hungary, Italy, and Spain. Lancisi, an Italian author of this time, whom we have before noticed, wrote a celebrated treatise on the complaint, *Dissertatio Historica de Bovilla Peste*, in which he attributed its origin to a particular poison. Michellotti likewise treated of the epidemic of this period, but supposed it occasioned by the unfavourable weather having injured the grass, and rendered the ground damp: *De Morbis Boum.* Gazola describes the disease as accompanied with pustulous sores, from which issued an ichorous bloody discharge: *De Peste Boum.*

In the years 1730 and 1731, it also raged, and was the means of producing several tracts on the subject. In 1740, there was another Continental attack, but which does not, from the accounts given, appear materially to have differed from the former. In 1744, 1745, and 1746, it again became prevalent throughout Holland, extending to Germany, and other parts of the Continent, making dreadful havoc. Buchard, an Italian author, wrote expressly on it at this time, and called it an acute malignant continued fever, or a contagious and inflammatory affection, accompanied with dysentery. The whole account this author gives of it is excellent, and the plan of treatment, for the time he lived in, appears highly judicious: *Buchard de Lue Vaccarum Tubugensi.*

But the person who has left us the best description of this terrible disease, is M. Sauvages, the illustrious Professor of Medicine at Montpelier. He describes it as very fatal; making its appearance by a distaste to food, and, when the symptoms had become well marked, the affected animal had a dull heavy air, the head was held down, the sight was indistinct; he grew restless, lying down and rising again frequently, with an unusual trembling; the hair stared, the eyes watered, the extremities were cold, and the whole of the muzzle was excoriated from the acrimony of the purulent running; the respiration became constrained and difficult, and the pulse from forty-five to fifty in a minute; while in health, he says, it only amounted to thirty-eight pulsations, more or less*. Purging was a constant symptom in the complaint after the first two days: but, previous to this, there was frequently an appearance of costiveness, and a little hard black dung was produced; after which, came on a constant evacuation of a deep green fluid, that was intolerably fœtid, but which, it was remarkable, other cattle, so far from avoiding, sought it, and seemed to have a delight in smelling to (*renifler*), and snuffing it up: and that dogs and swine would eat it: this matter on the fifth and sixth days assumed an oily appearance, with air bubbles on the top. The prognostic was favourable or unfavourable, in proportion to the violence of the diarrhœa, which was so fatal a symptom, that it frequently carried off the animal the day it appeared. There was usually great tenderness about the withers and spine, and frequently also an emphysematous appearance. On dissection there existed marks of inflammation, but seldom of gangrene: the paunch was generally found full of hard, dry, undissolved matter; the other stomachs were livid and inflamed, as was the internal surface of the intestines; the gall-bladder was

* It is probable that some error has accidentally crept into this account by this celebrated author; as neither the increase during illness, nor the natural state of the pulse, can be correct.

usually very much distended, with an acrid thick brown bile; and the lungs sometimes, likewise, exhibited marks of inflammation. Mons. Sauvages adds, that, on a calculation, nineteen in twenty of those attacked were killed by it. No specific was found for it, nor any means of prevention, but that of separating the healthy from the sick; even the dogs that went into the infected stables became diseased, and the persons attending upon the animals were so likewise. In conjunction with the other medical professors of Montpelier, this illustrious author recommends to bleed the animal the moment he is suspected of being sick, and to do the same as a preventive; and immediately after to give a purgative of aloes and senna: he also recommends to augment the insensible perspiration by means of stimulants, after which setons are to be introduced into the dewlap.

The other medicines employed, were the theriaca andromachi, or diascordium, with the testaceous powders to excite a flow of saliva, and a running at the nose: to give exit to the emphysematous air, he directs slight sections in the skin; and he advises also to acidulate the drink with vinegar. He adds, in another place, that bleeding and purging appeared hurtful in this disease; I suppose he means, that they were not to be proceeded with after the first day; but that mucilaginous fluids, ipecacuanha, and the lesser astringents, were the best means of cure. Perhaps it would be difficult to point out a superior mode of treatment to this. *Vide Mémoire sur la Maladie Epidémique des Bœufs de Vivarais.*

In 1756 and 1757 this disease raged in England likewise, which produced several tracts on the subject at the time, most of which did not outlive the continuance of the epidemic; but among them, one by Dr. Layard, a physician of London, was so much esteemed, that it became translated into several other languages. He describes the complaint as first appearing by a difficulty of swallowing, an itching of the ears, an involuntary motion of the head, and a staggering gait; to these succeeded the greatest debility, and a constant desire for rest: there was much cough, and the exacerbations of fever were greatest at night, with constant diarrhœa; the perspiration had a disagreeable smell, and there were little tumours felt under the skin in passing the hand over the body: these symptoms augmented usually on the seventh or ninth day, at which time, if the body became covered with large pustules or tumours, which proceeded to suppuration; if the fœces became less liquid, and the urine thicker or less pale, the prognostic was favourable; but if, on the contrary, the diarrhœa continued beyond this period, if the breath continued hot and the body cold, and the discharge from the eyes and nose increased, the animal appearing in pain, then death was usually near.

Dr. Layard's mode of treatment appears judicious: he directs the animal to be placed in an open stable, the litter frequently removed: those which were robust he recommends blood to be taken from; those that were lean, on the contrary, not: the body to be then washed all over with an infusion of aromatic herbs in water (if it had been in vinegar, it might have been better); this was to be repeated every day: he likewise directs setons in the dew-lap, and, if there were much appearance of inflammation, and the animal were also costive, he advises a purgative of lenitive electuary and Glauber's salts. In addition, he advises an infusion of madder and horse-radish, fennel, feverfew, rue, and sage, to be given night and morning.

From these united testimonies two indications present themselves; the one is a curative, the other a preventive one.

The *Curative Treatment* of this complaint may be, in a great measure, gathered from these united accounts. It may be added, that the treatment may be condensed into such means as will principally tend to support strength and combat putridity. Bleeding, even in the early stages, ought to be sparingly employed; but an active purgative may be with great propriety administered. Fumigations should be made use of tending to destroy contagion, and those of the nitric acid would be most proper. See *Fumigation, Mat. Med.* The abscesses should be bathed or fomented with hot vinegar; but, above all, I would recommend an active and observant trial of the following, given three times a day:—

Nitrous æther	half an ounce
Acetated liquor of ammonia	four ounces
Beer yeast	eight ounces.

Should there be much diarrhœa present, add to this, powdered opium one drachm; and likewise throw up a starch clyster frequently.

The *Preventive Treatment* must consist in first separating the infected from the healthy, and strictly preventing their future intercourse. Their usual stalls and houses should be fumigated. The unhealthy districts should be put under strict quarantine, and the healthy should destroy the germ of contagion if possible, by universal fires of green wood throughout the country. In these places particular care should be taken to house the cattle when the weather is intemperate, and all exposure to inclemency should be carefully avoided. It is not improbable also that a mild purgative every ten days might do much as a *prophylactic*. The houses in which the affected may have been, and all their appointments, should be washed with lime, and the apartments fumigated with the antiseptic fumigations. The bodies of the animals who die from the disease should be buried sufficiently deep to cover them from dogs, &c.; and their skins should be buried with them*.

SYMPTOMATIC FEVER.

By this is to be understood those general inflammatory appearances which accompany great local affection; that is, when any one or more

* For the agriculturist who may wish to prosecute his inquiries on this subject further, it may not be uninteresting to note the Continental works which contain the best information thereon:—Examen de la notice sur l'epizootie qui régna sur le gros bétail, par M. M. Girard et Dupuy, Directeur et Professeurs à l'école Vétérinaire d'Alfort.—Essai sur les epizooties, par M. Guersent, Paris.—Marasme (du) épizootique, des fourrages extraordinaires & de l'emploi des matières animales pour restaurer les herbivores, ou instruction sur les moyens d'arreter la mortalité du betail qui perit d'épuisement; par Collaine.—Memoir sur la maladie épizootique règne en ce moment 1814, sur les betes a cornes, dans le département du Rhône et ailleurs, par J. B. Gohier, Lyon.—Rapports et observation sur l'épizootie contagieuse régnant sur les bêtes à cornes de pleusieur departmens de la France.

Tableaux synoptique des differentes voies par lesquelles les maladies épizootiques contagieuses peuvent se communiquer, soit des animaux aux animaux, soit des animaux à l'homme, par J. B. Gohier.

of the vital organs are extensively inflamed, or where there is any great internal affection, there is always present considerable derangement of the system at large, accompanied with much general increased vascular action or inflammation; this is termed *symptomatic* or *compounded fever*. It is evident, therefore, that fever, in this instance, is not to be regarded so much a disease as a prominent symptom; and as such it is to be considered in the practice, and any attention to it is but a secondary indication: nevertheless, as it sometimes runs so high, as greatly to aggravate the other symptoms, wearing away the strength of the animal, so as to render him unfit to struggle with the real disease, it must still be attended to and regarded as a subject worthy of consideration. This is by much the most frequent fever of horses; for though other febrile affections certainly do appear, yet it is comparatively but seldom; whereas fever, combined with inflammation of some essential organ or organs, as of the brain, lungs, intestines, &c., happens every day*. We must, however, except from this the catarrhal fever, which is sufficiently frequent.

It is not easy to say whether the febrile disposition be antecedent to the local inflammation, which then becomes a consequence of it, or whether it be produced from it in the nature of metastasis; but I believe, from what I have observed, that local inflammation originates in both these ways. On the first attack of most fevers, there appears to be a particular disturbance in the action of the capillaries, perhaps by the application of a peculiar morbid stimulus which first increases their action, and finally impairs it: by this excitement the blood is driven into the veins, and this state seems to form the cold shivering fit preceding, or it constitutes a part of it. When this first effect is completely over, these vessels, before excited in their contractility, now become preternaturally enlarged, by the heart and larger arteries overcoming the resistance, and propelling a larger quantity of blood into them, and then there is first a return of heat, and at last sweat breaks out. Perhaps it may happen, when all the organs are acting in concert to overcome this contraction of the extreme vessels, some one part may be more weakened than another by the exertion, and its minute vessels rendered less able to contract on the distention that follows upon the hot fit, by which the weakened coats remain permanently distended, constituting local inflammation of that part; the irritation and derangement of which will keep up that fever as symptomatic, which before was primary: thus much must take place, to account for local inflammation arising from the attack of fever, and proceeding from it, which I believe is very frequently the case. It likewise is not difficult to suppose one organ in an accidental or even natural state of weakness, and which, in such cases, will be the one most likely to suffer. It remains to be remarked, that in some instances several organs shall be affected at once, and yet the fever

* The intricacy of the subject of fever cannot be better exemplified than by the variety of opinions formed on it now, when we have been studying it and suffering under it some thousand years. One splits and divides it into genera and species by the nicest distinctions, while another denies it any particular essence, but considers all inflammatory action as the same, whether local or confined; and asserts all the fevers called gastric, nervous, mucous, catarrhal, &c. &c. which occur without the influence of putrid miasma, are only *phlegmasiæ*, dependant on simple increased vascular action.

remain symptomatic: these cases become very complex, inasmuch as the symptoms are difficult to define; nevertheless the treatment must be that of general inflammation. When therefore, to the general characteristic marks of fever, which have been described, there are superadded other symptoms, we have reason to suspect that febrile affection is symptomatic, and owes its origin, or its continuance, to a local affection of some one essential organ; the particular mode of judging of which may be gained by attention to the details in Class II.

CLASS II.

INFLAMMATION OF ORGANS ESSENTIAL TO LIFE.

BY this is meant those internal inflammations, which though local and confined, yet affect organs of such magnitude and importance, as to form themselves each into a peculiar and marked disease.

INFLAMMATION OF THE BRAIN.

Phrenitis.] [Mal de Feu, ou Mal d'Espagne.

THIS disease, which is by farriers called *mad staggers*, and *phrensy fever*, is also by some veterinarians termed *apoplexy:* but which is a much more improper name for it than either of the former; for it has none of the characteristics of apoplexy, which is a mechanical rupture of some of the vessels of the brain; whereas this disease consists in an increased determination of blood to that organ, united with an inflamed state of its vessels. The *staggers* appears to exist in two different forms; one of which is primary or idiopathic, the other is secondary or symptomatic, and is dependent on the presence of some other disease. We have instances of this in the phrenitis which accompanies rabies, and in that present in specific gastritis, or stomach staggers. Idiopathic phrenitis appears under two different forms, one of which is known by the name of *sleepy staggers*, from the coma or sleepiness present; and the other by the term of *mad staggers*, from the delirium observed. I was formerly disposed to consider these as separate complaints, or, at least, as distinct varieties of one disease; but a more extended experience has disposed me to consider them as one and the same affection, differing only in the different degree of inflammatory action going on; and perhaps also on the different degrees of irritability in the organ attacked: and this mode of viewing it appears the more correct, when we observe how frequently the drowsiness and torpor, which accompany the complaint in the outset, give place to the delirious and furious states in the latter stages.

The comatose or sleepy state of the complaint renders it very liable to be confounded with another, but totally different disease, which originates in a specific inflammation of the stomach, and is at present known among veterinarians by the term *stomach staggers.* In this latter disease, such a paralysis takes place of the stomach, that it becomes incapable of contracting on its contents: and the pressure occasioned throws a vast quantity of blood on the brain, which also produces comatose symptoms, as stupidity, drowsiness, and an inclination to press the head forward. These appearances, being not dissimilar with those of true staggers, would make it appear difficult at first to decide between the two; but the increased urgency of the symptoms, particularly in the delirious state, is alone sufficient to distinguish them; add to which, that in staggers the eyes and mouth remain of their natural colour, or at least are only increased in vascularity; whereas in stomach staggers they are almost invariably tinged with bile. There is also present in the stomach staggers, a more generally diffused nervous affection, characterised by spasmodic twitchings, not common in the true phrenitis, with symptoms of mechanical pressure and diminished energy, and a sympathetic weakness dependent on, and always present with, inflamed stomach and bowels.

But, in some instances, a correct judgment can only be formed between these two diseases by a very careful comparison between the detailed symptoms: for in our description of stomach staggers, it will be seen that now and then a considerable degree of violence is present in this also, which might, without a conversance with the other peculiarities, mislead a casual observer. The phrenitis accompanying rabies, occasioned by the bite of a *rabid* or *mad* animal, as it is called, still more nearly resembles the mad staggers; but even here the observant practitioner can detect distinctions fully sufficient to ground an opinion upon. In the *rabid phrenitis* the symptoms evidently betoken, not only a frantic, but a decidedly mischievous disposition, which prompts him purposely to attack every thing which comes in his way; thus, not only are persons and animals within his reach attacked, but every thing around suffers; rack, stall, and manger, are all laid prostrate. In the true staggers nothing of this kind appears; the horse is wild, and beats himself about, and endangers every thing around him, but not by premeditated design: on the contrary, he simply labours under a violent spasmodic contraction of his muscles, uncontrolled by the judgment of his mind; from whence he throws himself about, falls prostrate, or kicks, from mere muscular irritation.

The *Symptoms* of true phrenitis, or staggers, are, a disinclination for food, with a slight running of moisture from the eyes, which, if attentively observed, even in the very early stages, will be found inflamed and somewhat flushed in colour; the nostrils also may be observed more vascular than usual: as the disease advances, the horse appears impatient, and throws himself about in a strange manner, as though frightened at something; or he falls into a drowsy state, holding his head low, and resting it in the manger, and which state sometimes continues till within a few hours of his death, when he becomes violently convulsed, and is carried off: but in other cases, about the second or third day from the attack, he exhibits watchfulness, his eyes sparkle, his nostrils extend, his head is raised, and he appears as though looking at the rack. Each succeeding hour aggravates the disease, if nothing be done to stop its violence; the animal, becoming more furious, bounds from side to side, and then perhaps falls in a state of insensibility on the ground, or dashes about the pavement in convulsive and insensible struggles, suddenly rising again to renew his violence. The pulse, under these circumstances, presents remarkable varieties. In one case it will be found much accelerated, but hard. In others, it will be found hurried and irregular; while in the comatose, or sleepy state, it is usually oppressed and slow. The other symptoms also vary, as the brain is more or less excited to increased action, or as it is more or less depressed by congestion. Thus the general secretions are sometimes increased, but more frequently they are diminished; from whence results a scanty flow of urine, which commences with the disease, and accompanies it to the last nearly, when a very considerable flow often occurs: costiveness is also an usual attendant. The progress of the complaint is various: it now and then destroys on the second or third day; at other times the fatal termination is protracted to the fifth, sixth, or seventh; or it may admit of a natural cure, by a resolution of the inflammation. When it terminates unfavourably, on examination after death, the pituitary membrane throughout has sometimes been found highly inflamed; the membranes of the brain are always very much so; and, in general, an increase of fluid has been found in the ventricles; the plexus choroides is often greatly enlarged, and more than usually vascular: it has, however, been seen compressed and pale.

The *Causes* of phrenitis, or mad staggers, may be various: a common one is, I believe, the translation of idiopathic fever to the brain. Excessive exertion, by determining blood to the head, may be a cause, with the usual alternations of cold with heat, when excessive: but however any of these may be the exciting cause, we are to regard the existing disposition as generally dependant on a plethoric state, for which reason it is seldom met with but in the young, robust, and in such as have acquired a full habit, particularly when acquired suddenly, by an injudicious removal from a low to a full diet, without preparation or restraint.

The *Prognosis* is favourable when the redness and flushing of the eyes decrease, when the horse becomes more tranquil, when the pulse becomes soft, uniform, and in proper number, when also the dung and urine appear in sufficient quantity, and symptoms of appetite return: but when the secretions continue small, the impatience increases, the teeth are heard to grate, and particularly if a sanious discharge issues from the nostrils, the termination proves in general unfavourable.

The *Cure of Staggers.*—As all the varieties of this disease appear to arise from an increased determination of blood to the brain, joined to an inflammatory state of its vessels; so it is evident that the cure must principally depend upon lessening the quantity of the blood generally, and on diminishing the increased action of the vessels of the part particularly. Both these indications are equally promoted by bleeding; and whenever this is early and largely practised, the effects are commonly salutary. In such a case, therefore, proceed to draw blood immediately to the amount of six, seven, or eight quarts, according to the age, size, and condition of the horse: as well as referring to the degree of violence in the symptoms. But it will be often found very difficult to draw blood in this complaint, from the furious, impatient state of the animal: under these circumstances patience must be exercised, and the practitioner should not be deterred, but must wait the momentary cessations of the violence, when he may boldly open one or even both jugulars, and suffer the blood to flow until something like the above quantity may be supposed to have escaped. Should the violence of the horse prevent the application of a pin to the vein, no danger need be apprehended from suffering it to bleed as much as it will, particularly if one only be opened; on the contrary, when the quantity that flows is not sufficient, a further encouragement ought to be given by a ligature passed round the neck. It has been strongly recommended, from very respectable authority, to bleed from the temporal artery in preference to the jugular vein; but as the distribution of this artery in the horse is somewhat different to what it is in man (*vid. b, pl.* 4), see also (*Angiology*), the propriety of the practice is questionable, except the jugulars cannot be got at, under which circumstances the practitioner would be justified in opening it, but not in the same manner as is described in bleeding from the human temporal, by dividing it across, for, if so done, the ends would probably retract under the skin by the muscular power in the artery: but it should be operated on by puncturing it in the same manner as is practised on a vein, and it may be secured if necessary afterwards by division or ligature, neither of which will often be requisite, for the first bleeding can hardly be too considerable: on the contrary, if it be even pushed until the horse be faint, it will be so much the better, and then the vessels will collapse as a matter of necessity. Under this view the situation of the temporal artery is purposely depicted in *p.* 4, *letter* b. On the living horse it may be always detected three or four inches below the root of the ear in a line from its base towards the nostril.

Having finished the bleeding, if possible, insert under the jaw a rowel well smeared with blistering ointment, back rake, and throw up a purging clyster (see *Mat. Med.*); and, if practicable, give an active mercurial purge by the mouth, either as a ball, or, if more convenient, dissolved as a drink (see *Purges, Materia Medica*). Should the symptoms continue violent in a few hours after all this has been done, bleed again largely, and blister the head, if it can be effected without danger of the ointment getting into the eyes: but if from his violence there is reason to fear this, I have, in such cases, very successfully encased the upper part of the head in a pitch cap, and have introduced the blister in the centre of this. Mr. Coleman recommends to pour boiling water on the pasterns, but I think stimulating them with the liquid blister might be more advantageously employed. It has also been recommended to apply cold water, or even ice, to the head; but much inconvenience attends the practice, and when the phrenzy is great, it is almost impossible. A current of cold air may be directed towards the head, while the rest of the body may be kept of a moderate warmth. There is little necessity to caution the attendant with regard to the food, for a total loss of appetite is usually present: if, however, from a false sympathy, the horse should be inclined to eat, he should be debarred from it on every account: the motion of the jaws is unfavourable to the return of the blood from the head: a full stomach is equally unfavourable; not to add, that the weakness occasioned by fasting would be particularly salutary here. When the delirium and frantic symptoms are very great, it would be very advisable to sling the horse as is done on board ships, which will effectually secure him from injuring himself, and render him more conveniently got at by the operator. It can hardly be necessary to hint, that the stable should be kept as cool as possible. When the disease assumes a comatose appearance, and the horse has what a farrier would call the *sleepy staggers*, the treatment must be exactly the same as that already detailed, and the blistering is as urgently called for in this as in the former; and active purgatives I think even more so, from the greater time allowed for their operation. In cases of amendment, it is prudent to guard for some time against any exciting causes of plethora, as I have seen it return with increased violence more than once.

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Oxen and sheep are subject now and then to a species of phrenitis, not essentially differing from that of the horse, which the country people call a *fever of the brain*, *phrenzy*, or *staggers;* the treatment of which is similar to that prescribed for the horse.

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SPECIFIC INFLAMMATION OF THE STOMACH, CALLED STOMACH STAGGERS.

This disease, from its resemblance to *staggers* in its symptoms, and from its cause being attributed to an over-distended *stomach*, has received the name of *stomach staggers*. To Mr. White, of Exeter, the veterinary world were indebted for a much more detailed and clear account of this complaint than any that had yet appeared, and though I differ from him in my opinion of the nature of the malady, I readily acknowledge that I have added also much to my stock of information concerning it from his researches. Mr. White thinks the complaint should be called the *symptomatic staggers*, in contradistinction to true phrenitis, which he terms the idiopathic staggers; and, under his view of the matter, there would certainly be great propriety in so calling it: but some experience, and a very close attention to the subject, have fully convinced me that, on a more extended acquaintance with this peculiar disease, it will be found to merit the novel designation I have given it. Several of our older writers describe the complaint with sufficient accuracy, but they all consider it as a primary affection of the head; and as their researches seldom extended to the examination of the morbid appearances of cases after death, so the cause remained involved in obscurity. Mr. Coleman, early in his career, conjectured that it originated in a simple distension of the stomach, and hence called it *stomach staggers**. It however appears to me, that what has been regarded as its *cause*, is a *consequence* alone; and that the distention of the stomach is a mere symptom of the complaint, but whose real nature seems to consist of an inflammation of that organ *sui generis;* differing from gastritis, or idiopathic inflammation of the part, as well as from the irritation brought on by chemical agents

* French authors also consider it as an *indigestion*. "Le cheval qui a une *indigestion* port la tête basse; il bâille fréquemment; sa peau est sèche et sa temperateur moins elevée que dans l'état ordinaire; l'animal cherche bientôt à appuyer sa tête; il pousse quelquefois les corps qui sont devant lui avec son front; d'autres fois il se recule au bout de sa longe, ou bien il frappe la terre avec un des pieds de devant, et tourne la tête vers son flanc. Le son (bran) est de tous des alimens celui qui produit le plus souvent cet accident."—*Esquisse de Nosographie Vétérinaire, par J. B. Huzard*, p. 135.

or poisons; though a morbid effect produced from something without, has been also hinted at as its probable source.

In all the cases that have been examined after death, one appearance was common to all; *an inflamed state of the depending portion of the great curvature of the stomach towards its pyloric orifice;* but a distended state of the stomach was not always present: it is therefore not unnatural to look on that as a cause which always exists, in preference to that, which, though common, yet is not invariably present. From the great frequency which a distended state of the stomach is met with in these cases, Mr. Coleman and Mr. White have been induced to consider mechanical pressure as the immediate cause of the complaint; and the weight of such authorities entitles the matter to great attention. These gentlemen regard the symptoms produced, as resulting from the sympathetic connexion between the brain and stomach, united to the effects which naturally arise from this distention throwing an inordinate quantity of blood on the brain. This gorged state of the viscus is considered as an accidental circumstance, dependent on any cause that prompts the animal to take in an inordinate quantity of food, particularly of a dry nature; and, hence, that it may, in many instances, be clearly traced to follow a full meal given after long previous fasting, the distention of which produces a mechanical debility in the organ: as a farther proof of which, Mr. White observes, that it usually attacks old, weak, and hard-worked horses. But, in my own experience, old and weak horses are by no means the only subjects of attack; on the contrary, I have seen it in the young and robust also, and, likewise, under circumstances where no exposure to irregularity in the manner or matter of feeding appeared to exist; and Mr. White himself candidly admits that it has occurred also under his observation as well at grass as in the stable; and in cases where there was no opportunity of paralyzing the stomach in the first instance by abstinence, nor any stimulus to over-distending it afterwards. In these instances, at least, we must therefore look for another cause.

But we need not be indebted to theory to induce a belief that this disease is not always dependent on an accidental distention of stomach; we may at once advert to facts clear and decisive. There is before the public, through the medium of Mr. White, a very full account of this complaint as it existed in the neighbourhood of Swansea, in South Wales, where it appears to have raged in an endemial form, and to have assumed an epidemic and even contagious character. We are told by Mr. White's correspondent, that it was most prevalent between July and September, and was fatal in seventy-six cases out of eighty. No age or sex was exempted, and, whether in the stable or at grass, or working underground in mines, all were equally obnoxious to it. It has also occurred more than once in the same neighbourhood, and always in an epidemic form: it likewise gave ample proof of its being highly contagious. Mr. White, though he admits these appearances were strongly characteristic of a contagion; and though he also allows that the country people familiar with it, all consider it "*catching*," as it is termed; yet he himself very unwillingly allows it any character of this decription: but, from the very clear and satisfactory statement of the disease, as it raged near Swansea, and from what I have myself seen of it, I have no hesitation in considering it, in some instances, as a contagious epidemic. In minutes of a correspondence, now before me, where my opinion was required, it occurred during the spring, and attacked three horses out of five; the other two were removed as soon as the nature of the disease was understood, and thereby escaped. Other notes made by me, of actual cases, and other correspondences relating to the subject, all tend to confirm the opinion I have already stated; nor does it at all go to weaken this argument, that it often selects a single horse from among a number, the rest of whom shall all escape it: the same happens every day with typhus fever in the human subject, which is too notoriously contagious to need comment; and it is not attempted to be denied that it is only under particular circumstances of malignity that it does assume an epidemic and contagious form.

From all these considerations I feel, therefore, no hesitation in considering this as a disease whose proximate cause is dependent on *a specific inflammation of the stomach;* distinct and differing from those inflammations of this organ brought on by the usual causes of such affection; as, translation of common fever, access of cold, or from the action of any common poisonous substance. I was first disposed to regard this matter in the novel point of view it is now placed in, from observing the effects of inflammation (evidently specific) of the stomach in other animals, but particularly from that which occurs in the rabies, or, as is popularly termed, madness of dogs: for, whoever will be at the pains to inform himself by an attentive observation of the symptoms while living, and of dissections of rabid canine subjects when dead, will find that this malady unquestionably consists in an inflammation specific and *sui generis,* principally affecting the stomach of the animal: and though the inflammation is not in rabid dogs, nor in other brutes, confined to this organ alone, but extends also, in some cases, to the other viscera as well of the chest as belly; yet this very circumstance rather tends to strengthen the proofs I would draw from it: for when the lungs form the principal seat of the complaint, the symptoms are always more violent, or, rather, the manners of the animal are so: and it is from these cases, and these only, that this fatal malady has derived the popular name of *madness**. But when, on the contrary, the inflammatory attack is principally spent on the stomach and the bowels, it produces symptoms extremely similar to what occurs in stomach staggers; and it is worthy of remark, that the analogy holds good still further; for in almost every rabid dog who dies under that stupid drowsy kind, called *dumb madness,* there is present also an enormous distention of the stomach from substances taken in; and here, likewise, the inflammation is usually greatest at its large curvature and pyloric orifice. This distended state of the stomach, in the rabid dog, is so very common, that it may be almost regarded as an unerring characteristic of the complaint: and it appears, that the disposition thus to fill the stomach is actually dependent on the peculiar inflammation of the part, and on that alone; for idiopathic

* It is worthy of remark, also, that the rabid malady in other brutes, as the horse, the ox, and sheep, always produces symptoms of great fury and excitement; and, in all these, the lungs are principally inflamed, while the stomach and bowels are, in general, subordinately affected.

gastritis is sometimes seen, and the inflammation produced by mineral poisons is sufficiently common; but in these no such disposition is observed; whereas, in the specific inflammation of the organ, produced by rabies, there is a peculiar and almost invariable tendency to distend the stomach sometimes with food, but more commonly with other substances. It further appears to me, that this uncontrollable desire (the effect of some morbid sympathy) is simply to *fill* the stomach, the sensation of hunger having no part in it: therefore, after death, in almost every one of these cases, an enormous mass of undigested anomalous matter is found within it, composed of every trash that comes in the way of the animal. Exactly the same, I conceive, occurs in the horse, the specific inflammation of whose stomach stimulates him in like manner by a similar morbid sympathy to take in a large quantity of food, the paralytic state of which prevents its contracting on its contents; consequently, though this distention is not the original cause of the complaint, yet it will greatly aggravate the distress and urgency of the symptoms.

The *Symptoms* of this specific gastritis commence generally by a drowsiness; the horse eats slowly and at intervals, but he still recurs to it again; the breathing is slightly accelerated, but the pulse suffers no material alteration, except now and then when it is rather quickened, and in other instances again it appears rather oppressed; in the greater number, however, as has been observed, it is not materially altered until within a few hours of death, when it invariably becomes small and oppressed. There appears a particular diminution of all the secretions; the costiveness is peculiarly obstinate; and the urine is ejected by a convulsive effort, and in small quantities; but the quality is not generally altered. In every instance there are strong marks of biliary affection, and all the mucous membranes are tinged yellow by it; the probable cause of which is, that the liver, to a certain degree, partakes of the inflammatory affection. The nostrils, the eyes, the mouth, and the inner part of the anus, are therefore invariably yellow under this disease. There is generally, also, some appearance of slight rigor at the beginning of the complaint; but as it advances, the extremities become, one half hour, very cold; and, the next, the horse breaks out into a profuse sweat. The sympathetic effects on the brain very constantly and early shew themselves by the nervous or spasmodic twitchings present over the whole panniculus carnosus, which are particularly observed in the breast and hind quarters: the nervous affection is also accompanied by an early and characteristic muscular debility, which is such as to make the unfortunate sufferer bend his legs and totter, as though falling; and he is likewise observed not to rest his head in the manger, as in the sleepy staggers, but he elevates it, in some of these cases; and as though he wished to gain a fulcrum of support, he forces it often between the rack staves.

I never saw the disease in a horse at grass; but when it does occur there, it is said that it is peculiarly marked by the manner of the animal, and the state in which he is frequently found: if he be discovered moving, he is seen to stroll about unconsciously till he meets with some obstacle against which he fixes his head, where he remains tottering. Now and then, however, there is some degree of irritability and violence present, but much more generally he is in a stupid, drowsy, and almost insensible state; and, in either case, there is always present a marked distress of countenance and manner: the jaws usually have a considerable rigidity, but which does not amount to total jaw-locking. These detailed symptoms are the common attendants on the malady, and such as are usually present in every case; but the spasmodic twitchings, the obstinate costiveness, and the marks of biliary affection, are constant and invariable.

Prognosis.—As, in all the instances I have seen, the disease has terminated fatally, so I can only give, from my own experience, the symptoms that betoken mortality; which are, an obstinate continuance of the costiveness, profuse sweats alternating with cold extremities, and the under jaw rigid and nearly immovable: but from the accounts derived from other sources, returning health, in the very few who have recovered, has been signified by the convulsive twitchings abating, the jaw loosening, but particularly by the fæces passing.

The Cure.—Here, likewise, I can offer little on my own experience; having never witnessed a successful issue. This general fatality is not dependent alone on the obstinacy of the malady, but may be attributed, in some measure also, to the time generally lost before application is made for help. Mr. White has however been more fortunate; and in the case or two that fell under his notice, where recovery did take place, he attributes it to an early overcoming of the costiveness: but, if my ideas of the nature of the complaint are correct, however much a free exit to the fæces is to be wished, our efforts should be particularly directed to overcome the inflammation of the organ concerned, which alone occasions the obstruction to the passage of the aliment. I perfectly agree with Mr. White, that bleeding promises but little change of benefit, seeing the disease arises from a *specific* affection. Nevertheless, in all cases, I would at least try it; and when the symptomatic phrenitis is considerable, I would do it largely. The chest, or belly, about the girthing place, should be actively blistered; and, as unloading the bowels must, under every circumstance, be desirable, immediately give the following:—

Sulphate of magnesia (*Epsom salts*)	eight ounces,
Castor or linseed oil	ditto,
Watery tincture of aloes (see *Mat. Med.*)	ditto.

Dissolve the salts in the tincture of aloes, united with an additional teacup full of warm water, and then add the oil and give.

From a peculiar sanative effect that castor oil appears in other cases to produce on the stomach and bowels, I should be disposed to give this remedy a trial first, and then proceed to back rake and throw up a purging clyster (see *Clysters, Materia Medica*): but as the costiveness is usually very obstinate, and the symptoms very urgent, so I would not wait more than two or three hours, when I should recommend to repeat the same; or, if judged more expedient, a strong purging ball (see *Purges, Materia Medica*) may be dissolved by rubbing it down with a yolk of an egg and a little warm gruel or ale. But I should be disposed to advise the drink in preference, more frequently repeated.

Those who reason from analogy only, will deprecate even the exhibition of the drink on an inflamed stomach; but one fact is worth all the theory in the world, and it does appear, from experience, that no medicine given by the mouth aggravates the uneasiness *; which may be accounted for on a consideration of its specific nature; and certain it is likewise, that no remedies are calculated to do more good, than such as tend to draw the inflammation from the stomach by acting on the bowels; and, considering the paralysed state of the organ, a liquid remedy is much more likely to pass than a solid one, which does not seem to have been considered by Mr. White in his directions for the treatment: for the same reasons, also, active clysters should be continued.

INFLAMMATION OF THE LUNGS.

Pneumonia.] [Péripneumonie.

The lungs in the horse form a very large mass, which, united with their extreme vascularity, renders them very susceptible of inflammation; and as this affection proves very frequently fatal to him, so the subject is a very important one to the veterinarian. This disease was formerly but little understood among farriers, which added much to its fatality; and if no greater improvements had been made in the art, than have taken place in the knowledge of the causes, effects, and mode of treatment of this disease alone; still the founders of these improvements would have been eminently useful, and deserved well of the community. Farriers, from observing the gangrenous state of the lungs in these cases after death, supposed that their patients died from some long-continued malady, which gradually decayed these parts, from whence they called it the *rot:* and their treatment of the complaint was exactly what such a supposition would lead to; as hot stimulating drugs to stop the *rotting* process. But as we now know that the disease consists in an active inflammation in the parts, we are aware that this heating plan is the most destructive that can be pursued, and must end in death in the majority of cases in which it is practised. Other farriers again, observing the difficulty of breathing present in it, have supposed that the lungs rose towards the throat, and have hence named it *rising of the lights:* these persons have set themselves to give weighty substances, mechanically to keep down the lungs; and, at the same time, they combined with them stimulant drugs, so that the baneful effect has been the same.

Writers on human medicine have usually described under thoracic inflammations two different diseases, one of which, termed *peripneumony,* is considered as an inflammation of the *substance* of the lungs, and is characterised by either a quick but soft pulse, or by an oppressed one. The other, called *pleurisy,,* is an inflammatory affection of the *membranes* only of these organs, and is distinguished by a hard and more full pulse. The older English writers on farriery also, however good, trusting too much to analogy, and deriving but little from experience, or from observations made on morbid anatomy, have also described at length, after the human, two distinct inflammatory pulmonary affections, one proper to the pleura, and the other confined to

* The French treatment is, a bottle of wine rendered more stimulant by the addition of a glass of brandy.

the substance of the lungs. The French authors of celebrity, as La Fosse, Bourgelat, and Vitet, describe a distinct affection of the pulmonary membranes, under the term *pleurésie:* but it was the peculiar fort of the French writers of this time to split differences, and to make numerous varieties, and their more modern teachers are not wholly free from the same disposition to minute classification. Mons. Huzard, jun., so late as 1820, says, "L'inflammation du poumon est bien souvent compliquée de l'inflammation de la plèvre, cependant il arrive quelquefois que ces deux affections existent l'une sans l'autre." Neither can it be denied, that the inspections, during frosty weather, at knackers or horse-killers, of the bodies of the numerous fatal cases of thoracic inflammation, will present some instances where the membranous covering of the lungs are much more highly inflamed than the parenchyma: but I never observed one instance in which the vascular structure of the lungs was not also sufficiently inflamed to form the disease pneumonia. Neither did I observe, that those wherein serous effusion was present, as hinted at by Mr. Percivall, vol. ii, p. 268, were principally of this nature. Mr. Shipp, in his *Cases of Farriery,* not only leads to the opinion, that pleurisy may exist without much peripneumony; but he also describes the difference in the symptoms which characterise this variety. Mr. Percivall, who also inclines to the existence of genuine pleurisy in the horse, yet remarks, "I know of no difference myself in the *symptomatology* of pleurisy and peripneumony." For my own part, with the exceptions I have already noticed, and the circumstance that some of these cases are characterised by less oppression of pulse than others, I know of no distinction that can properly be drawn in the horse either from the *symptoms,* the *terminations,* or the *morbid anatomy* of pneumonic cases, sufficient to establish two separate diseases; and which circumstance renders the term *pneumonia* peculiarly appropriate here, as strictly defining the existence of the two affections as one defined disease; and such, also, I believe to be the opinion of the majority of the best informed veterinarians.

Symptoms.—The approach of pneumonia is not always characterised by the same degree of intensity. It often presents sudden marks of considerable affection, and, at others, the symptoms steal on insidiously for two or three days before they beget much attention. Neither are these precursory symptoms by any means always the same. A disturbance in the regularity of the temperature of the body is often first observed: the horse is found to have occasionally two or three times in the day a staring coat, with legs, ears, and muzzle cooler than usual. At others, a regular shivering fit ushers in the complaint, to which succeed the usual characteristic marks of fever. A short dry cough will sometimes precede the other usual symptoms, and will continue a marked feature of the complaint; and in other cases very little cough attends it throughout any of its stages. Whatever other symptoms precede its full formation, a quickened respiration is sure eventually to come on, and which is always performed with difficulty and pain. In extreme cases, the flanks heave with short but very quick respirations. The general surface of the body will frequently be found alternately hot and cold; but the extremities, as the legs and feet, the ears, muzzle, and tail, as the disease advances, remain invariably of a clayey coldness. The eyes are often moist and somewhat blood-shot, but the mucous surface of the nostrils is invariably reddened to a high scarlet. The pulse presents variations in different cases: in many it is marked by considerable quickness, as from 90 to 100, and which is now and then, though but seldom, accompanied with some hardness. In other cases, on the contrary, it is found to be but little accelerated: and instead of being fuller than natural, it is marked by a peculiar indistinctiveness and oppression, very common to this complaint, and not unfrequent in inflammations of other important visceral organs also. The appetite is commonly lost, and there is usually present a remarkable appearance of distress and anxiety in the countenance, which is heightened by frequent anxious looks at his sides. The whole body seems stiff and sore, and the horse is disinclined to move; on the contrary, he stands with his head extended forwards, his nostrils outstretched, his fore legs somewhat apart and forward, and he seldom if ever lies down. If the complaint proceeds, the pulse becomes still more oppressed and irregular, so as to present, at the region of the heart, nothing but the faintest flutter; the legs, ears, and muzzle feel still more intensely cold, although partial sweats may visit the carcase. The nostrils change to a still more livid hue, and the air they expire is cold. The mouth now becomes deadly cold and pale; convulsive twitchings affect the breast, neck, and face; the teeth grate, and the animal dies from the effects of congestion in the overcharged lungs. In some instances this termination occurs as early as the second or third day *.

Such are the usual and characteristic symptoms of this important disease, for which we can now readily account, since our more extended acquaintance with the animal economy and with morbid anatomy. A suspension of the important functions of the lungs, must naturally lead to some particular morbid phenomena. The tension and enlargement consequent on the inflamed state of these organs, must of necessity produce extreme pain and distress to the horse; particularly in those cases where the membranous linings of the chest are much affected. The obstruction also which the congested state of the lungs must offer to the passage of the blood through them, must deprive the left side of the heart of its accustomed quantity and stimulus; while the right side of it must be gorged to distention, and, as has happened, to actual bursting occasionally. We are likewise, under these circumstances, at no loss to account for the indistinct and wavering pulsations felt in it, obstructed by distention on one side, and rendered feeble on the other from lack of stimulus. As the blood received from

* This circumstance, Mr. Percivall judiciously remarks, has led to some very oppressive judicial arbitrations for horse dealers. Horses, particularly young ones, are purchased from the dealers' stables sound, and in perfect health often; but which are nevertheless not prepared for much fatigue or great changes of temperature, and still less for the unskilful management of a new owner; who probably rides his new hobby as a schoolboy rides his new rocking-horse, night and day. The circulation is inordinately hurried, cold is taken, pneumonia follows, and the horse dies under the management of some sapient farrier; who, to save his credit, opens the horse, and exulting over the gangrenous appearance which himself and the disease have united to bring on, swears he died "rotten as a pear," and "must have been long unsound." In such a case, as Mr. Percivall observes, the dealer is cast (but most unjustly), and the gentleman recovers (equally unjustly) his money.

the lungs is both small in quantity and deteriorated in quality by the inflamed vessels, so not only is the circulatory force unequal to propel it into the extremities, but the animal heat given out is unequal, and probably rather the effect of re-action than of oxygen regularly distributed: hence we have a permanent coldness of the extremities. The congested lungs likewise, receiving but little air, and acting on that little imperfectly, endeavour to remedy the want by an extreme quickness of action. The sensibility of the chest prevents the full expansion of the lungs by the operation of the usual muscular agents, as the diaphragm and intercostal muscles; and thus the assistant respiratory muscles of the neck, fore quarters, and extremities, are called in as aids, which occasions the fore legs to be placed forwards and wide apart, with the head protruded, to facilitate the entrance of the air; while the fixed fore legs act as fulcri for the serratus major anticus to act on (*vid. p.* 338), to receive which assistance the distressed animal remains continually standing. The deteriorated blood, not sufficiently oxygenated, stains the nostrils with its purple hue; and when drawn from the jugulars, is also found more intensely dark than usual. Under these views we are enabled likewise to account for the extraordinary change frequently occasioned by one full bleeding only.

The *terminations of pneumonia* are more varied and distinct than in most complaints. We have already mentioned an early and fatal one by suffocation from gorged air cells, and the irritation attendant on it. Instead of this, another equally fatal and but little more protracted takes place, in the form of gangrene, in which the parenchymatous mass will be found black, tender, and filled with grumous fœtid blood. This state may be known previous to death by a fœtid smell, with some sanious discharge from the mouth and nose. Another fatal termination is by serous effusion into the cavity of the chest, forming hydrothorax. At a very uncertain period of the disease, as from the third, fourth, or fifth day, to the fourteenth, the exhalent vessels of the lungs begin to pour out a serous fluid, which they usually continue until they completely fill one or both thoracic cavities, and the animal dies here also by suffocation. This termination, which is sometimes equally acute with the first, is betokened before death by a serous discharge from the nose, without fœtor, by an irregular pulse, which occurs with a deceptive abatement of the violence of the symptoms. After death, a large quantity of serosity tinged with red particles of the blood, and frequently intermixed with coagula, is found in one or both thoracic cavities. These form the early fatal terminations to the disease; but there are other no less unfortunate, but more protracted windings up of the account, one of which does not often take place until the third or fourth week, and sometimes a longer period from the attack, and is one also that frequently occasions the junior practitioner much mortification, and sometimes leads him greatly astray. It arises, equally with the last termination, from serous effusion into the cavity of the chest, but it is a more gradual one, and is accompanied with a remission of all the inflammatory symptoms, leaving only this disposition in the exhalents to pour out the interstitial fluid in great quantity, but gradually; combined also, as it usually is, with a tendency in the vessels, at the same time, to form numerous adhesions between the costal and mediastinal pleuræ, and also to deposit masses of coagulable lymph, which float in the serum, or are adherent to the surrounding parts. In these unfortunate and deceptive cases, the horse looks more lively, warmth returns to the extremities, he begins to eat, and the pulse appears favourably changed and increases in strength; and though it still betokens disease, it is only a very experienced observer that can detect any difference in it from that of a horse under a real amendment. In other respects, the variations from a convalescent state are so trifling, that they might most readily escape detection by the junior practitioner, particularly if he be still further thrown off his guard by the flattering picture drawn of the animal's situation by those around him. But in general cases, the experienced veterinarian will detect, with a moderate degree of attention, a peculiar pulsatory stroke, notwithstanding the improved state of it before alluded to. There will be present a slight degree of *hurried irregularity* in it better felt than described. The peculiar sensation this pulse gives to the practitioner, may be still more distinctly felt by referring to the source, placing the hand against the left side, when the heart itself will afford a criterion to the touch, that it is beating through a watery medium, as though vibrating within a bladder of water. In some instances, a smart rap on one side of the chest will produce an undulation very evident to the hand on the other*. This examination, when at the same time contrasted with that of a healthy horse examined in the same way, will best teach the peculiarity. The existence of the water may be also generally suspected from the state of the coat, which usually stares and feels unkindly; and there is likewise, in most of these cases, a yellow serous discharge from the nostrils, at first thin, but afterwards thicker and glutinous; and it may be observed, that the animal appears alarmed on any sudden exertion, as turning quickly in his stall; he will be particularly so on holding his head up to receive a drink, which arises from a fear of strangulation †. In this state, something between sick and well, a horse will continue to deceive the persons around him unused to these cases, for a longer or shorter period: suddenly, however, he is taken with a shivering fit, and all his former symptoms recur; and though they return with diminished violence, yet they usually carry him off in a few hours. It may be, therefore, prudent to recapitulate to the practi-

* Mr. Shipp expresses the matter thus:—"Upon pressing the hand upon the side of the breast, the water may be felt to gush against the hand, but with more violence in the act of expiration than during inspiration."—*Shipp's Cases of Farriery.*

† Mr. Percivall observes also, that "indistinct fluctuations may be perceived, by applying the hand, or the ear, against the ribs, while an assistant strikes smartly the opposite side: in this manner *percussion* and *auscultation* may be made of great service to us. Lastly, the *stethoscope* may be made trial of," vol. ii, p. 271. It is without any invidious motive whatever, that I express my regret that the value of these admirable lectures becomes greatly lessened by the elaborate care displayed in bedecking them with such a redundancy of classic flowers, which, however they may enhance Mr. Percivall's reputation as an elegant writer, must materially detract from it as a useful one. As society is constituted at present (and I note it with regret that it is so), the majority of veterinary students cannot boast of an education equal to the reading of a work so written, without an accompanying glossary, or, more strictly, dictionary of terms. To such, a phraseology, drawn with a studied and sometimes with a forced care, from the depths of erudition, may prove dazzling, but it will also prove bewildering; thus frustrating the express intention for which the work professes to have been written.

tioner, that the distinguishing marks of these kind of cases are to be drawn from the peculiar state of the pulse above described;—the breathing continuing rather quicker than natural;—an unhealthy feel, and staring of the coat;—a disinclination to lie down;—and an evident dread of any hurrying movement, or to a considerable elevation of the head. After death, it is surprising to see what disorganization has taken place in the chest: the lungs are usually full of adhesions, and large masses of coagulable lymph will often be found adhering to them, while lesser particles float frequently in the serous fluid with which the chest will be filled. Now and then, but much less frequently, pneumonia, or peripneumony, will produce suppuration in the lungs; in which case also, as soon as the suppurative process commences, some appearance of a remission of symptoms takes place, but not so perfect a one as in the former instance: matter will flow from the nose, the pulse will become hurried and irregular, and at length the animal will become choked without previous warning, or he may linger and die tabid from hectic irritation or tubercular obstruction. A very common termination is by a deposit of coagulable matter into the cellular structure of the lungs, by which respiration becomes impeded, and the aerating functions of these organs obstructed. Some modifications of this injurious deposit produce wheezing and thick wind, while others end in complete broken wind. The substance of the parenchyma is so perfectly altered, and its cells so blocked up with coagulable lymph, in bad cases of this description, as (contrary to their usual property) to make them sink in water. To particularize these we say, there are pneumonic terminations, just hinted at, not fatal, but still unhealthy and unfavourable. In one of these, arising from the coagulable part of the blood being thrown into the air cells, respiration becomes considerably impeded, and the animal is ever after forced to make up by more frequent or more forced inspirations, what ought to be effected by fewer or more easy ones; and which state forms what is called *thick wind*. At other times, an increased irritability of the lungs themselves, or of the mucous membranes of the bronchia and trachea, is left, and which subjects the horse to a long continued or permanent *chronic cough:* if the affection be considerable, it lays the foundation for *broken wind*, which, as an accidental cause is applied, sooner or later in these cases takes place. In other instances, this pecular disease succeeds immediately to convalescence. Sometimes also the lungs themselves are left free from organic affection, but coagulable lymph is thrown out across the trachea or windpipe, which narrows its capacity at some particular part or parts, and the air, rushing through these strictures, produces a sonorous noise called *roaring*, as hereafter detailed.

On the subject of symptoms, it remains only to guard the practitioner against mistaking pneumonia or inflammation of the lungs for *catarrh*, or that of the mucous membranes in contiguity, with which it may be confounded; though the experienced veterinarian will readily distinguish between the two. In the catarrhal epidemic, the extremities do not continue invariably cold, but are now cool and now warm; the distress of countenance is not so great; sore throat is commonly present; the breathing is less laborious, and the pulse seldom oppressed. The cough in catarrh is generally deep, and very painful; a weakness, not corresponding with the violence of the symptoms, is very early seen in the complaint; and though the lining of the nostrils may be inflamed in catarrh, it is seldom so much so, unless pneumonia be coming on, as to present a purple hue. The principal necessity which exists for making a careful distinction between the two diseases, arises from it not being found prudent in the catarrhal affection to push the bleeding, and other parts of the depleting system, so far as in the pneumonic; and also from the greater necessity of placing the horse in a cool temperature in the latter, to what exists in the former.

Inflammation of the lungs has also, by the inexperienced, been occasionally mistaken for colic, because the horse sometimes expresses considerable uneasiness, and often looks round to his sides; in which mistaken cases the treatment generally pursued has been such as to increase the disease; but in colic, the horse expresses acute pain, by stamping with his fore feet, or kicking at his belly with his hinder; by turns he lies down and rolls, and then suddenly rises: while, on the contrary, in peripneumony he never lies down, but stands stupidly quiet, except now and then, when he may look at his flanks; but without any of the impatient indications of pain which colic forces him to: it may be added, also, that the nasal membrane in colic remains unaltered in colour, unless enteritis be at hand.

Causes.—The alternation of heat with cold is probably the most usual cause of this complaint. It was formerly considered that it could only be produced by a removal from a warm to a colder temperature; but it is now known that the sudden access of a warmer medium produces it also, though certainly not in an equal degree. Mr. Coleman, I believe, thinks that exposure to simple cold never produces the disease; and that, though turning horses to grass without preparation may emaciate them, it never produces peripneumony: but this appears not borne out by experience, and has occasioned ill consequences. Human subjects, horses, cows, sheep, and dogs, are all more liable to coughs, colds, and pneumonic affections, in cold climates than in warm ones. The persons who slaughter horses in London, are accustomed to expect a glut of dead animals in hard frosts, from the fatal effects of inflamed lungs. It is true that the candidates for the former doctrine may say, that this still arises from the effects of exposure to *stable heat*, supervening upon the frost: but this cannot be the case in cows, sheep, farmers' horses, and those of others who do not treat them so artificially. Nor do we want numerous other facts to prove that a sudden access of cold is more certainly prejudicial than that of heat: few persons in the habits of hunting, but have met with, or heard of, cases of horses, who, from plunging into a river, have very soon after been attacked with the complaint; and in such cases it has been observed, that a permanent rigor has commenced immediately, and the animal could never be got universally warm again. Hunting on a cold scent, with frequent checks, or travelling with a cold wind blowing against the chest; washing the legs and body with cold water while the horse is hot; a sudden removal from a warm stable to a cold one, may any of them occasion the disease: and, as has been remarked, there is reason also to believe, that the removal from a cold stable to a warmer one, or from grass to a warm housing, without preparation, will also produce it. In fact, so obnoxious are horses to affections of the chest from a change of temperature, whether the change be from a warmer to a colder medium, or otherwise from a colder to a warmer; that it is very seldom a horse is brought from a dealer's stables, who does not, in a day or two, exhibit some cough. When a horse is removed from a cold temperature into a hot one, it is evident that the hot medium is immediately applied to the seat of inflammation; and as hot air must greatly tend to accelerate the circulation, so it is not difficult to account why it can produce the disease, and this more certainly if the heated air be less pure than that which the animal was removed from: when, on the contrary, the removal takes place from a warm to a colder situation, a similar effect perhaps also takes place; the cold air is immediately applied to the lungs, which may, by its sedative properties, particularly if the change be very great, by this means be suddenly weakened. But it is not only by application to the immediate cellular substance of the lungs, through the medium of respiration, that cold acts injuriously on them. It more often exerts its baneful influence through the medium of the skin, with which these organs are united by a sympathetic and peculiar union, and which is liable to be at all times exposed to the vicissitudes of temperature: for both skin and lungs appear emunctories of the fœcal parts of the blood, and hence the sympathy between them is observed to be very great; and any thing that may prevent the exit of this fœcal matter, called *perspiration*, from the vessels of the skin, will throw much more of it on the lungs.

When, therefore, in addition to these occasional causes, we consider that the lungs are very large as well as very important organs; and that in an animal of speed they are peculiarly extensive in their surfaces, and extremely vascular in their structure; we shall be at no loss to account for their tendency to inflammation. This tendency also seems much heightened, in common with the proneness to other diseases, by a life of art; for in a state of nature, or one nearly approaching to it, they are seldom attacked. The cows even experience this increased tendency, arising from artificial habits, as is observed in those kept near London and other great cities, where they are more artificially supported, and subjected to occasional housing.

The *Prognosis* in pneumonia or peripneumony must be formed from the strength of the symptoms, such as a greater or lesser difficulty in respiring, more or less oppression in the pulse, more or less intensity of cold in the extremities, &c. &c. The progress the disease has made should also be considered, and the accidental circumstances under which the animal may labour. The veterinary practitioner should never lose sight of the greater rapidity with which all acute inflammations in the horse run to their termination than they do in man, or in animals with weaker powers; but in this particularly, which renders caution here doubly requisite, when forming a prognosis relative to it.

A *resolution* of the inflammation is the most favourable mode of its termination, and this may be expected when the pulse approaches a natural state, or rises on bleeding; when the horse shews an inclination to lie down; when the distressed look diminishes; when the blisters applied, rise kindly, and the rowels, if any, inflame readily: and particularly the appearances are favourable when the breathing becomes less laborious, the breath itself of a natural temperature, and when the legs and ears resume their usual warmth. But if, on the contrary, the pulse do not rise on bleeding, if the breathing continue very laborious, if rattling in the throat come on, the pulse being oppressed, or hurried and irregular, with partial cold sweats, and with an extreme dejection of manner; a fatal termination may be expected, either by direct gangrene from the extreme distention of the pulmonary capillaries, or from serous effusion into the cellular texture of the lungs. It is likewise always a most unfavourable sign when the skin proves insensible to external stimulants; that is, when the blisters and rowels remain without operating. The vital stores of the body are drawn from the lungs; and when they become diseased, all other parts lose their powers, and consequently their irritability and capability to be acted upon by external agents is diminished. I hardly ever remember to have seen a horse recover where neither the blisters nor rowels would act; such cases always betoken an intensity in the inflammatory action, and shew that the balance of power between the parts is destroyed beyond restoration.

The *Cure of Peripneumony*.—The principal indications of *cure* are two; first, to lessen the increased vascularity or distention of the lungs by bleeding; and next, to endeavour, by external stimulants, to change the diseased action; that is, by raising an external inflammation, we may hope to lessen the internal one: and it must be remarked, that as this disease is obstinate and quickly fatal, so the treatment must be active and immediate.

The cure should therefore be promptly begun by bleeding, according to the age, size, and strength of the animal, regard also being paid to the time the disease has existed: for, when the treatment is commenced too late in the complaint, the bleeding cannot be carried to the extent that it may be in the early stage. As a general rule, it should be remembered that bleeding, in peripneumony, is never to be continued longer than it raises the pulse; that is, supposing it to be previously in an oppressed state, which, in true pneumonia, it usually is, and in every variety it is quick and without fulness, even though somewhat hardened. More good is also gained by one bleeding within the first twenty-four hours of the complaint, than from numerous repetitions of it afterwards. From a moderate sized horse, five, six, or seven quarts, or even more, may be drawn; and should the symptoms indicate a necessity for it, particularly if the pulse rose on the first bleeding, in five or six hours take three or four quarts more; and, as long as the breathing continues laborious, the extremities permanently cold, and the pulse oppressed, but rising on the flowing of the blood; so long the bleedings should be repeated to the amount of two or three quarts at a time, at intervals of six or eight hours. This is recommended under a supposition that the treatment commences soon after the attack: but, if otherwise, and violent symptoms have existed thirty-six or forty-eight hours, the bleeding must be repeated with more caution, and the pulse most attentively watched; or the opposite extreme may be fallen into, and such debility succeed as may produce the very event we wish to avoid, by hastening gangrene or effusion. It is of considerable importance to draw the blood quickly by means of a large orifice, as directed under *General Inflammation*, and to suffer the blood drawn to cool gradually without disturbance, by which the buffy surface will have an opportunity of shewing itself, and afford an additional indication of the propriety of persisting to bleed, or prove a check to its continuance. Immediately after the first bleeding, some active stimulants should be applied to the surface of the chest. Blisters have the effect of taking off the hair, which disfigures the horse for a long time afterwards; and therefore their use is sometimes objected to. It is to be remembered, however, that they act by stimulating a part not immediately affected, and thus prove a counter irritant; and that there is no specific virtue in one matter more than another beyond its degree of stimulating action to the part it is applied to; the degree of irritation necessary must be proportioned to the degree of inflammation it is intended to counteract by becoming a counter irritation to. *(See Blisters)*. If that be very considerable, the medicinal stimulant must be so likewise; and we know of none whose energy is great in this respect, that will not raise the cuticle and separate the hair. Consequently, as those matters called blisters act powerfully as stimulants, and particularly as they continue such action for some time, they should never be dispensed with. Whenever therefore the symptoms are at all urgent, proceed at once to blister the chest, first shaving the hair from the brisket or breast in front, and between the fore legs, and also from the sides behind the elbows; and then rub in a blistering ointment wholly made of cantharides. In less urgent cases, and in such where the loss of the hair is particularly objected to, any of the milder modes detailed under the head *Blisters* may be used. If also a strong prejudice exist in favour of rowels, and the symptoms are not very urgent, one may be inserted between the fore legs, and another ten or twelve inches further behind; but each should be quickened in its action by smearing with turpentine or blistering ointment *; or, what would be better, the sides may be blistered, and the brisket rowelled. But nevertheless, in all truly urgent cases, it should be remembered, that actively blistering is the quickest mode of subduing the inflammation. With some pathologists, blistering is thought to increase arterial action, and hence to be unadvisable here: but when sedative remedies are employed, the stimulating effects of proper counter irritants confine their effects to the skin, or parts to which they are applied, and prove most salutary. The state of the bowels should be next attended to, and a loosened but not a purging state encouraged; to this end, back rake and throw up a laxative clyster; and in default of the operation of these in moderately loosening the bowels, give a laxative drench composed of any of the neutral salts (see *Laxatives, Materia Medica*): but active purging must be by all means avoided. During this stage of the complaint, more particularly, no stimulating internal articles should be given, under an idea of removing the existing weakness, or of raising the oppressed pulse. Cordials of all kinds will inevitably, during the active stages, aggravate the disease; which can only be counteracted by lessening the arterial action generally by venæsection; and locally, by counter irritants. It was early the College practice to attempt to lessen the morbidly hur-

* Osmer pursued a plan which was by no means an ineligible mode of raising a quick, active, and permanent stimulus to the integuments of the chest. To the favourers of rowels it might farther recommend itself. It consisted in making small openings in the skin, and introducing pledgets of tow smeared with blistering ointment.

ried circulation by the sedative effects of nausea and of cold. The nauseating articles used were aloes; and as long as they simply nauseate, and refrain from actively purging the bowels, they do good. But as they are very apt to promote active and sudden purging, when not expected so to do; they are not to be depended on; for it cannot have escaped the notice of every observant practitioner, that the derangement of one important bowel in the horse almost to a certainty leads to some derangement of those in contiguity with it. Veterinary practitioners of the present day, therefore, endeavour to keep the bowels soluble by other means, or by using the aloes only to a certain point; and then depend on other articles, of which the veratrum album, or white hellebore, stands foremost as a regular nauseant. This method, and my opinions upon it, are detailed at length, when treating on diffused inflammation. With regard to the application of cold also, as a direct sedative and lessener of arterial action, some alteration of the practice of the ingenious Professors at the head of that useful seminary, has, I believe, taken place. Mr. Coleman formerly recommended, after blistering or rowelling, that the horse might be turned out into the open air, however cold, without other medical treatment than nauseating doses of aloes. The principles of such practice, it is probable, were mainly correct, and the theory whereon it was formed was ingenious, and probably just: but it was, like most favourite theoretic points, found to be carried too far; since which, with a praise-worthy candour, the application of cold has been moderated in a degree. That cool or even cold air, applied to the surface of the inflamed air cells, must tend to lessen irritation, there is little doubt; and the circumstance that horses, when left to themselves in this disease, will be always found opposite a full draught of air, bespeaks the relief it occasions: but the sedative effect on the skin by full exposure, there is reason to think, proves most hurtful. On the contrary, as we deem it of the utmost consequence to encourage an equal circulation and a warmth over the surface and extremities, so we direct to hand rub the skin to produce these effects, and then to clothe moderately; and as it is, if possible, of still more consequence that we restore a due circulation to the extremities, which it is in general very difficult to effect; so the legs should be very actively rubbed till something like warmth appears on them, and then they should be bandaged up either in hay-bands, or, what is preferable, in flannel. An efficient mode of restoring the circulation to the extremities, is to blister them; and in desperate cases, and in those where blistering might be otherwise advisable, as in windgalls or weakened sinews, it would be more particularly eligible; for, by these means, much blood would be drawn from the chest, and the action of the vesicatory would keep it in the extremities. The muzzle, ears, and whole of the head in fact, may be considered as an extremity, and, as such, should be likewise particularly attended to; the ears may be hand rubbed, and the head clothed in a neck hood; and if no blistering be made use of to the legs, litter well up to the belly with clean straw.

But it must at the same time be kept in mind, that the more care we take to promote warmth in the surface, and in the extremities, by clothing, &c., so we must be the more careful to counteract any tendency these means might have to encourage arterial excitement, and which, as before observed, is best effected by a cool and pure temperature of about fifty degrees. If the nauseating plan of treatment be not attempted by the active methods described under diffused inflammation, proceed with the milder sedative effects to be gained from antimonials, nitrated potash, tartrate of potash, and foxglove, in the following form, which, according to my experience, will be found to answer the end desired in most casess.

No. 1.—	Antimonial powder	two drams
	Digitalis (*powdered foxglove*)	two drams
	Nitrated potash (*nitre*)	three drams
	Tartrate of potash (*cream of tartar*)	ditto.

Mix with honey to make a ball, and give every four, six, or eight hours, according to the urgency of the symptoms.

In cases where the cough is urgent, and the soreness of chest very distressing, the following formula is to be preferred, as more immediately tending to relieve these symptoms:—

No. 2.—	Tartarised antimony	two drams
	Powdered foxglove	one dram and a half
	Nitrated potash	three drams
	Simple oxymel (see *Mat Med*)	four ounces
	Liquor No. 3	eight ounces.

Or, in lieu of this liquor, add linseed tea, gruel, &c., and give every four, six, or eight hours.

With regard to food, no anxiety need be entertained for the first twenty-four hours, during which time the less the animal eats the better; but, if green meat can be procured, as being cooling and opening, it should by all means be given; and in the absence of this, bran mashes may be allowed, with only a small quantity of hay: but no corn should on any account be offered, nor should his mashes be given hot, or hung round the head, as in the *catarrhal fever*, or *distemper*. On the contrary, every thing that heats the air carried to the lungs increases their action, and the disease can only be properly treated by a strict observance of whatever tends to diminish the inflammatory diathesis. In this point of view, though, as before noticed, we must carefully abstain from producing purging, we should also as studiously avoid costiveness, which is best done by back raking, or by aperient clysters; and, in case of failure in these, a more efficient laxative may be given by the mouth (see *Laxatives*). The body and extremities should be frequently examined, and whenever any part is found to be getting cold, the means before detailed should be resorted to, to promote a return of the circulation. During the continuance of the complaint, linseed tea, slightly warmed, may be given to drink frequently; and if this be refused, give chilled water, and, occasionally, horn down the tea; or, if preferred, the following *liquor*, particularly if there be cough and much chest soreness:—

No. 3.—	Linseed, and liquorice root, of each	four ounces
	Mallows	two handfuls.

Boil in six quarts of water half an hour. It is, however, prudent to observe, that as little disturbance and force should be offered the horse as possible in this complaint, therefore horning down fluids should never be practised but when absolutely necessary.

By steadily pursuing this mode of treatment for the first thirty-six or forty-eight hours, it may be expected that the distention and inflamed state of the pulmonary vessels will subside into resolution, which will be indicated by the appearances detailed in the prognosis. The strength must now be supported to assist this process, and prevent a disposition to gangrene; but this must not be done by heating cordials, but by thick gruel, or malt mashes, and if the debility become extreme, by the following, substituted in lieu of the foregoing medicines:—

No. 4.—Powder of ipecacuanha	two drams
Tincture of opium	half an ounce
Camphor	two drams
Acetated liquor of ammonia (see *Mat. Med.*)	four ounces.

Rub the camphor with the tincture and powder, and then add the acetated liquor of ammonia, and give with half a pint of gruel, or liquor No. 3.

But this is recommended only in cases where the severity of the inflammatory symptoms has relaxed, and when from the existing debility there is reason to fear a gangrenous termination, as will now and then occur from the effect of this very debility.

When, on the contrary, after the period before alluded to, the inflammatory symptoms do not relax, push the medicines prescribed, particularly No. 2, still more actively, as, every three hours; rub in more blistering ointment to the neighbouring parts; or should that which has been rubbed not have operated, scald the chest with boiling water, applied by means of cloths wrung out between two other cloths, which will prevent scalding the hands of the operator. Continue active in this and every other part of the treatment detailed, until a favourable termination has been obtained; and, when it has taken place, it must be yet remembered, that there are few complaints in which there is more danger of recurrence; every prudent precaution should therefore be used, as regular temperature, mild diet, gentle exercise: an early exposure to cold also ought to be guarded against. The whole list of what are termed *expectorants*, particularly in the early stages, should be carefully avoided, as they are always *stimulants;* nor is their benefit much more manifest at any period of the complaint: digitalis, tartarised antimony, and oxymel, are the best and only expectorants admissible throughout the affection, as nauseants and cold air are the best sedatives. All active irritants, under the term of sudorifics or sweating medicines, should be also shunned, more particularly in the beginning of the disease.

Inflamed Lungs in Neat Cattle.

Horned cattle are also subject to pneumonia, but not by any means in an equal degree with horses. Cowleeches and graziers call the complaint *rising of the lights*, and it has also provincial names unnecessary to be noticed here. Various causes may occasion it, but it is, in general, produced by exposure to inclement weather, as driving rains with easterly wind, or snowy nights: oxen become affected with it sometimes from over driving, and I have seen the disease attack calves. In its appearance it is very similar to the same complaint in horses: the animal heaves violently at the flank, the mouth opens to render respiration easier, the nostrils are very red, and the linings of the eyes also, and a moisture distils from them; the pulse also is very quick, but small. The head is hung down dejected, but the beast in general refuses to lie down, though not so invariably as is observed in horses; and the ears, legs, horns, and muzzle, are always intensely cold.

The *proper Treatment* of the complaint does not essentially differ from that recommended for horses, and should be begun by bleeding to the amount of four or five quarts; a large ox may lose six quarts: and here we may very properly avail ourselves of the power that nauseating remedies have over the action of the heart and arteries, by the means detailed in diffused inflammation: and otherwise, if the cost be not objected to, give half the drink No. 2, detailed in the peripneumony of horses; but, if preferred, exhibit half of No. 1, either as a ball or mixed for a drink: or the following will nauseate, and has been used with success:—

Tartarised antimony *(emetic tartar)*	a scruple to thirty grains
Powdered foxglove	one scruple to two
Nitrated potash *(nitre powdered)*	two drams
Infusion of tobacco	eight ounces.

Mix and give two or three times a-day, according to the violence of the symptoms. The infusion of tobacco is made by boiling two drams of the herb in a quart of water, for a quarter of an hour.

The bowels of the beast should be opened, but not purged; and the sides either covered with a mustard poultice (see *Materia Medica)*, or they may be blistered, and a large seton placed in the dewlap: the legs should also be wrapped up in haybands, and a rug thrown over the body, but the temperature of the air should be kept particularly cool. The heating remedies of cowleeches should be most carefully avoided, and even the recipe of a more correct practitioner, containing two drams of camphor, must be considered as infinitely too stimulating. In six hours after all these are done, if amendment be not very evident, repeat the bleeding, and increase the doses of the remedies until evident nausea is produced; but, if distressing efforts to retch appear, lessen the quanties; beginning always with the smaller dose, and after wards increase it if there be occasion.

Inflamed Lungs *in* Sheep.

None of the writers on horned cattle describe *peripneumony* as a disease affecting sheep; but I have seen it well marked, and in them, also, its origin could be clearly traced to exposure to inclement weather. Among my notes of practice, I find that the disease was rather prevalent among the few sheep that were kept near London in February 1808. Among other cases that fell under my notice, I was sent for by Mr. Adams, of Mount Nod, near Streatham, to see the affected ones in his flock. From the shepherd's account I gained, that all the sick were attacked nearly together, immediately succeeding a very stormy cold night: five of whom were dead when I arrived, and five others remained very ill with it; and it may be noticed that the whole of them were ewes with young, and within a month of yeaning. The first symptom observed was the refusal of food, after which one and all had a peculiar stedfast fixed look; from this they would reel about, elevate the head in the air, become convulsed, and fall backward in a strong fit; and when the fit ceased, the teeth would grind so as to be heard to a great distance. The flanks heaved violently, the nostrils and eyelids were red, and from the nostrils distilled a watery moisture in some, and a purulent one in others.

I opened the five dead ones, and, in all, the parenchymatous substance of the lungs was highly inflamed; in some, the whole of the lobes, in others only one side, was affected; but wherever the inflammation reached, that part was condensed almost into a solid mass by the congestion; some of the air cells also contained pus. The costal and mediastinal pleuræ were little affected. In two, the liver was also slightly inflamed, but which was not a primary but a secondary effect, brought on by the participation of neighbourhood. It is somewhat remarkable that each of them contained two fœtusses. The five that were living I immediately bled and blistered; and, as soon as it could be procured, a drink was given to each, composed of nitre and tartar emetic, which appeared to arrest the disease, as the whole recovered; and all, except one, went their full time. This one, which, though prematurely delivered, yet must have had less time to go than the rest, yeaned while I was standing by; and, in despite of her illness, which was excessive, she made feeble efforts to nourish and cherish her young one, and appeared rather amended by the event: both mother and young lived.

In the peripneumony of sheep the treatment in nowise differs from that of neat cattle: bleed from the amount of half a pint to a pint, shear the sides and blister, and give one-third of either of the recipes directed for kine; house the sick, but not too warmly; and if the cud be lost, drench with gruel.

CHRONIC INFLAMMATION OF THE LUNGS, ENDING IN TUBERCLES AND PULMONARY CONSUMPTION.

A slow inflammatory action sometimes goes on in the lungs which ends in the formation of tubercles. It sometimes appears a primary formation or purely constitutional affection: but this is but seldom the case. It more commonly follows catarrh or pneumonia. In these instances the horse for some time seems convalescent: he is however occasionally observed somewhat affected, and, gradually, a short dry cough is observed: the coat becomes also harsh, dry, and unthrifty; and if the pulse be examined, it will present an indication very different from a healthy state, and this, when the accompanying morbid symptoms are comparatively trifling, for it will be found almost invariably quick and small. As the disease advances, I have always distinguished a peculiar smell about the horse; the appetite becomes now affected, and pus mixed with mucus is passed from the nostrils, which in the latter stages is mixed with clots of coagulæ, which escape both by the mouth and nose in the act of coughing. In the still more advanced stages the discharge increases and is very fœtid, the hair falls off, the body wastes, and the complaint either degenerates into absolute glanders or farcy; or the animal sinks under the hectic irritation. If a horse be destroyed in the early stages, the tubercles appear like knots or kernels dispersed through the substance of the parenchyma, sometimes smaller, sometimes larger; at one time darker, and at another lighter than the surrounding substance. In later stages these are found degenerated into abscesses, and, last of all, universal ulceration is found, with occasional vomica.

As the disease is invariably fatal, it is useless to prescribe an uncertain *treatment* for it.

INFLAMMATION OF THE HEART.

Carditis.]

Idiopathic inflammation of the heart is a very rare disease in the horse *; I never met with more than two instances: but in conjunction with pneumonia it is very frequently inflamed; and its inflammation ends in serous effusion into the pericardium, forming hydrops pericardii. The general *symptoms* it produces are so similar to pneumonia, that it is commonly mistaken for that disease. The pulse, however, it may be remarked, is peculiarly characteristic of the disease; at least it was so in the cases I saw of it. It was marked by oppression as in pneumonia, but superadded to that, a peculiar wiry yet fluttering feel was observable, totally distinct from any other I had ever felt. The countenance and manner were also marked by a peculiar expression of anxiety and alarm; but acute pain did not appear present. Both cases terminated fatally. The treatment of carditis in no respects differs from that of pneumonia.

INFLAMMATION OF THE STOMACH.

Gastritis.] [Gastrite.

This disease is very rare also, though the stomach of the horse is certainly sometimes primarily attacked with inflammation, in which cases it is very difficult to detect it, from its similarity to inflamed bowels. It is evident that it is not meant here to include those inflammations that are produced by acrid substances taken in; the symptoms in which cases are more definite, and will be treated of in another place: neither is included the specific affection called *stomach staggers*. When idiopathic gastritis occurs, the uneasiness is extreme; there is a loathing of all food, and if any thing be given by the mouth it creates increased pain for a long time afterwards. The animal breaks out into cold sweats, lies down and quickly rises again, as in inflammation of the bowels; and the loss of strength is most remarkable: the pulse is usually quick and much oppressed. If the disease can be clearly detected, treat it in every respect as directed under Enteritis, except as regards internal remedies. Of these the following may be tried:—

* It does not enter into the nosological arrangement of Mr. Huzard, which is an additional proof of its rarity.

Dissolve half a dram of superacetate of lead (*sugar of lead*) in eight ounces of water, to which add four ounces of very pure castor oil, and give every three hours.

In a well marked case, pouring iced water into the stomach might not be an improper experiment.

INFLAMMATION OF THE INTESTINES.

Enteritis.] [Tranchees Rouge.

THE *Red Colic* of the farriers is a phlegmonous inflammation of the peritoneal covering of the intestines, so called in distinction from the flatulent or spasmodic affection, termed, by the same persons, *gripes*, *gullion*, and *fret;* and which will be treated of in another place. Next to inflammation of the lungs, enteritis, or inflamed bowels, is the most frequent and fatal of the local affections of the horse, and of which there appears two distinct kinds; the one affecting their villous coat or surface, and producing purging; the other attacking the peritoneal coat, and accompanied usually with obstinate costiveness. It is this latter that forms the subject of our present consideration; the former will be treated of hereafter. From an imperfect acquaintance with the art, it has been common for farriers to mistake enteritis for spasmodic colic, and the error has commonly proved fatal to the affected horse; for the "*comfortable things*" and *heating drenches* given on such occasions always increased the inflammation, and frequently produced gangrene. A careful distinction should therefore be made between the two, which may be readily done by attending to the characteristic marks of each as particularly detailed in spasmodic colic.

The *Symptoms.*—It usually commences by a shivering fit, to which succeeds heat of skin, restlessness, loss of appetite, the mouth being particularly hot and dry, and the inner membranes of the eyelids and the linings of the nostrils rather redder than natural. As the inflammation advances, the pain increases so as to force the horse to lie down and get up again frequently; but, as the pain is less acute, he very seldom rolls on his back as in the gripes. Sometimes, however, he kicks at his belly or stamps with his feet, and in all cases he scrapes his litter or stall with his hoofs, and looks wistfully round towards his sides. The pulse is frequent, sometimes as quick as seventy or eighty degrees, but it is usually small and rather wiry. The breathing is accelerated, but is not usually laborious. The belly is painful to the touch, which does not occur in colic: it is also hot to the feel, and the pain, instead of remitting as in colic, is constant. The extremities are cold, while the surface of the body is often hot. The bowels are usually confined, and if any dung be evacuated, it is in small, hard, and dry masses. The urine likewise is made sparingly and of a high colour; and a strong character of the complaint is a very early and excessive debility.

The *Causes* are various, but they are generally dependent on the application of cold, as washing when hot, or plunging into a river; the drinking of cold water has likewise produced it, though more frequently this occasions spasmodic gripes. A long retention of the fæces may bring it on, as likewise hernia or intus-susception, which is occasioned by one part of a gut becoming invaginated within another: it may also be produced by metastasis, or the translation of the inflammatory diathesis of another part, or of general fever, or by the communication by continuity of the inflammation from other parts, as I have often witnessed. Another and not unfrequent cause arises from flatulent colic, either neglected or improperly treated, which I have many times seem degenerate into enteritis under such circumstances. Calcular concretions have also brought it on.

The *Prognosis.* - If the costiveness be early removed, if the pulse become softer, more full, and less frequent; if the pain remit, and the heat of the body and extremities appear equal, it will terminate favourably. But if the costiveness remain obstinate, or, otherwise, a voiding of black fœtid matter appear; if the pulse become more quick and waver also, and if the extremities continue invariably cold, the danger is great. And when added to these if there be a peculiar earthy cadaverous smell from the mouth, with cold sweats, delirium, and extreme debility, and particularly if the belly become more and more tense, the termination will be almost to a certainty unfavourable; and as soon as the pain ceases in such a case, gangrene may be known to have commenced.

The *Treatment.*—Like most of the other inflammations of important organs, this requires a very energetic and early application of the remedial means, and which, it may be remarked, must be here still more particularly prompt than in most other cases, as an instance of recovery seldom occurs where the treatment has been delayed beyond the second day: indeed, it often destroys in twenty-four hours. Bleeding is the first indication, and if the subject be young, large, and plethoric, six or seven quarts may be safely taken away; and should the symptoms continue unabated, the same may be repeated in four hours, to the amount of four or five quarts more; nor should even a third lesser bleeding be omitted at the same distance of time, if the inflammatory appearances have not become mitigated. The bleeding may be known to have a salutary effect by the pulse becoming softer and fuller, particularly if it shew a disposition to rise as the blood flows. Here also it is proper that the blood be abstracted quickly and from a large orifice. As soon as the first bleeding is over, proceed to back rake, to remove any hardened dung that may obstruct the passage, and which, if suffered to remain, would infallibly aggravate the complaint, and which indeed, in many instances, is the cause of it: the distressing strangury that sometimes accompanies the red colic, is also frequently as much produced by the pressure of hardened excrement as by a renal participation in the inflammatory affection.

It is not the dropping away of a few balls of hardened dung, nor the passage of some thin glairy matter, which shews that no obstruction exists: on the contrary, when these are present, a most obstinate costiveness may yet remain farther up in the passage; and a flow of thin fæces may escape by a groove formed by the side of an obstructing portion of dung, as has happened *. Unless, therefore, there be an evident free passage to all the fæcal matter, and that the excrement be wholly softened, it is always proper to rake; for it must not be lost sight of, that, whether as a consequence or a cause, constipation ag-

* Sometimes a very large fæcal accumulation takes place in some one or more of the pockets of the colon. In such case the only difference is that the symptoms are less acute.

gravates the disease, and is always present. Neither does amendment seldom if ever take place until that be removed. It is always of consequence to bear in mind, that as the state of the bowels is such as not to render it prudent to allow of strong purgatives being given by the mouth; so the greater activity is required to empty them mechanically, and by the assistance of clysters, which should be thrown up very frequently. Till the relaxation be complete, the injections should be mildly laxatives ones, as recommended in the *Mat. Med.* Afterwards warm water only, or thin gruel, will be sufficient. The quantities composing the clysters should be very considerable also, so as to penetrate beyond the rectum, and to enter, if possible, the colon and cœcum (see *Clysters, Mat. Med.)*

The next indication is to raise a brisk external inflammation over the belly, to lessen thereby the internal affection; and in this case even the cantharides are hardly quick enough in their action: but a more speedy determination to the skin may be made, by first fomenting the belly with hot water for a quarter of an hour, and then by applying a large mustard poultice farther liquefied with oil of turpentine, or with the liquid blister (see *Mat. Med.)*, which may be spread on coarse linen, or a horse cloth; or, what is preferable, the fleshy side of a newly-stripped sheep skin may be covered with it, and then applied close to the belly by means of flannel rollers, which will retain it in its situation. When this has remained on for three or four hours, if an evident abatement of symptoms have not taken place, proceed to blister in the usual way *. If a situation were to occur, where nothing besides of a blistering nature was at hand, the belly might be actually scalded with boiling water, or a hot shovel might be drawn over it; or any other means may be made use of to stimulate the abdominal surface that are in the reach of the persons employed on the occasion. It next becomes a consideration as to what remedies may be properly given by the mouth, which must greatly depend on the degree of costiveness present. In a case where the obstruction did not appear obstinate, I should recommend that castor and linseed oils be given united, six or eight ounces of each shaken together with a little gruel. When the bowels are more closely constringed, unite with four or six ounces of the watery tincture of aloes (see *Mat. Med.)*, six or eight ounces of the sulphat of magnesia dissolved in gruel, which should be repeated every three or four hours till full evacuation be obtained. In cases of extreme danger, where the expense will not be considered an object, it will be prudent to advert to the use of croton tiglium; the oil of which may be given in doses of fifteen or twenty drops every three hours until it operates. The powdered seed has also a purgative quality in doses of twenty-five to thirty and forty grains *(see the subject of Purgatives)*. Before the costiveness is overcome, we should be careful of increasing the distention of the bowels by much liquid;

* In human enteritis a very marked advantage has been received from the use of very large bread and milk poultices, applied over the whole surface of the belly. The cessation of the inflammation followed so rapidly after the use of this mode of applying external warmth, that it might be worthy the veterinarian's trial. On the contrary, a Dr. McCarthy relates, that, in tropical climates, human enteritis is successfully treated by cold water externally and internally applied. Neither will the observant pathologist find any difficulty in reconciling both these treatments to fact or to theory.

given by the mouth; but when a free passage is obtained, considerable quantities of thin gruel, or linseed tea, may be horned down. The horse should be clothed warm, to promote a determination to the skin; the legs ought also to be bandaged up, and plenty of litter allowed; at the same time the external temperature should be kept cool: and in this, as in every case of illness, the patient ought by all means to have the use of a loose box.

INFLAMMATION OF THE INTESTINES FROM SUPER-PURGATION.

As the former affection consists of a phlegmonous inflammatory attack on the peritoneal covering or coat of the intestines; this latter is usually an affection of their villous surface, the consequence of the administration of improper purging medicines, either as to quantity or quality; by which such a state of irritation is brought on as ends in inflammation. It is commonly accompanied with purging, whereas the former has almost always costiveness connected with it: neither is the pain so acute in the latter, consequently the horse seldom expresses so much uneasiness by rolling or stamping; the pulse is also quick and small, but seldom hard. If the symptoms of inflammation be very active, that is, if the pain approaches distress; if the extremities feel cold, and the pulse betokens much vascular action, three quarts of blood may be drawn; but unless these appearances exist in force, it will be more prudent to omit it. Stimulants should, however, be applied to the bowels, as in red colic; the clothing also should be warm, and means taken to keep up the circulation in the extremities by hand rubbing and bandaging: the stable also, in this disease, should be kept warm. The following drink may be given every four or six hours:—

Prepared chalk	two ounces
Powdered gum arabic	half an ounce
Powdered catechu	two drams.

Mix, in half a pint of thin starch, arrow root, rice liquor, or tripe liquor; and, in case the purging be considerable, not only give this by the mouth, but also mix the same with two or three quarts of rice or tripe liquor, or thin starch, and give as a clyster, which will be found peculiarly useful and efficacious. If the diarrhœa should be excessive from the first, or should prove obstinate afterwards, add to the drench, powdered opium and powdered alum, half a dram of each.

Inflamed Bowels *in* Neat Cattle.

Both the kinds of this disease, already described as common to horses, are also not unfrequent among kine. The enteritis, or red colic of horned cattle, presents similar appearances to those which occur in the same complaint in horses, except that it is in these somewhat more difficult, I think, to distinguish between the red and the flatulent colic, which arises from our lesser conversance with the manners of these animals than we are with those of horses. The treatment in no wise differs from that we have already laid down: bleeding, opening the bowels internally, and stimulating them externally, being here also the principal means of cure.

The *inflamed purging state* is likewise not unfrequent among cattle, but in them it does not draw its origin so much from the effects of purging medicines, as it does from a diseased state of the natural purge of the body, the bile; and to which form of the disease, from the greater complexity of their biliary structure, they are found peculiarly liable. Here the treatment pursued must depend on the cause, which will sometimes, as in horses, arise from inflammation of the internal surface of the intestines; in which the curative plan must also be the same as detailed for the removal of the same complaint in horses: but when it is dependent on a mixed inflammation, partly phlegmonous and partly villous, as is the case frequently when the liver is concerned, and which may be known by the accompanying symptoms betokening irritative fever, then the treatment must be more analogous to what is prescribed below for hepatitis.

INFLAMMATION OF THE LIVER.

Hepatitis.] [Hépatite.

The liver of the horse is but seldom *primarily* affected with inflammation; though, when other great abdominal inflammations take place, then this often participates; and now and then also it becomes the immediate object of attack.

Symptoms.—The complaint commences by appearances not dissimilar to a mild attack of inflammation of the bowels, but the pain is not so acute. There are usually cold extremities, heaving of the flank, a pulse quick and hard, but not very full, hot mouth, and considerable yellowness of the mucous lining of the nostrils, the conjunctive membrane of the eyes, and the surfaces of the mouth, and which tinge in some degree characterises it from other affections*. It is sometimes, indeed, usually accompanied with costiveness, for the liver ceases to secrete, and the bile, previously formed, is not passed into the intestines, but becomes, from the increased activity of the absorbents, carried into the blood, and from thence is deposited on the skin, which is the cause of the yellowness observed. But now and then, instead of a stoppage to the secretion, there is a diseased increase of it, and the complaint is, at such times, accompanied with a purging of black fœtid stools. A few years ago many cases of this kind fell under my notice about the same time, at the close of a very hot summer. In every instance the symptoms of depressive fever are great, and the languor extreme: sometimes so much so, it is hardly possible to keep the horse on his legs. The progress of the complaint varies much; I have seen it fatal in three days, and I have known it continue three weeks, and destroy at last; in which protracted cases, it is usual for the cellular membrane of the whole body to become suffused by a serous fluid, forming extensive anasarca, or, as a farrier expresses it, the horse has water farcy. This disease is, as might naturally be expected, often confounded with an inflamed state of the bowels; and indeed it very often is connected with the inflammatory affections of these or some other of

* It is to be observed, however, that the liver is so liable to become secondarily affected by other great local inflammation, that yellowness of the eye-lids, nostrils, &c., is not uncommon in enteritis, pneumonia, &c. Thus farriers make every great internal fever, a case of *Yellows*.

the abdominal viscera, from the general tendency observed in these affections to spread from one to another.

The *Prognosis* is favourable if the extremities are not invariably cold, if the weakness be not extreme, and if the pulse improve on bleeding: but if the languor increase, and the extremities cannot be got warm; if the breath be hot and fœtid, and the pulse small and beyond 120 in a minute, then it is extremely unfavourable.

The *Cure* should be attempted; first, by bleeding to the full extent of the powers of the animal, and the same should be repeated at intervals of four or six hours, if complete success do not follow the first abstraction. Blister the sides of the belly; or if preferred, apply a mustard poultice over the whole: but blistering is most to be depended on. The costiveness should be overcome by back raking, by clysters, and by the following, repeated every six hours till it operates:—

Submuriate of quicksilver *(calomel)*	one dram
Antimonial powder	two drams
Powdered aloes	three drams.

In cases where there is already diarrhœa or purging, the lancet should be used more sparingly, unless the inflammatory symptoms be urgent, and the state of the pulse shew a capability of bearing it, in which case it is as necessary as in the other. It is a repetition only of it that is less advisable here than in the former instance. If the heat of the abdomen be considerable, rub in some liquid blister also (see *Materia Medica)*; and instead of the purging ball, give the following:—

Castor oil	eight ounces
Gruel, or linseed tea	six ounces
Powdered ipecacuanha	half a dram.

By the help of the yolk of two eggs beaten with the oil, and the gruel added gradually, a smooth uniform mixture may be made, and which will be found peculiarly useful to amend the state of the evacuations, and should be repeated every other day, giving the following ball also twice every day:—

Powdered opium	half a dram
Submuriate of quicksilver *(calomel)*	half a dram
Powdered camomile	half an ounce.

Mix with honey to make a ball. No apprehension need be entertained that the calomel will increase the diarrhœa, as the opium will sufficiently restrain it. This treatment will be found singularly efficacious in this complaint; this caution only being requisite, that should the disease be protracted beyond the third day, the calomel must not be persisted in, for fear of salivation; but instead, a course of tonics with steel may be entered on for four or five days, and then again have recourse to the calomel, &c. &c., as an additional security against relapse. In other respects, as diet, clothing, &c. &c., treat as directed under inflamed bowels.

Inflamed Liver *in* Neat Cattle.

From the increased complexity in the structure of the liver in neat cattle, they appear more subject to hepatic affections than the horse; but these affections in them are more usually of a slow chronic kind;

nevertheless now and then acute hepatitis appears, with all the symptoms that characterise it in the horse. Both varieties of the complaint likewise are observed, but cattle are more subject to that which is accompanied with diarrhœa, from the greater disposition in them to accumulate bile by the presence of a gall-bladder. In either case the treatment must be similar to what is directed for the horse, except that it would be prudent, in the acute kind accompanied with costiveness, to give a lessened dose of antimony, from the different degree of irritability in the one stomach to the other. The treatment of that which is dependent upon, or accompanied with, a vitiated state of the bile, must also be similar: on which subject more information likewise may be gained by referring to diarrhœa and jaundice in cattle.

I have never seen distinct hepatitis in sheep, though chronic affections of the liver are sufficiently common among them.

INFLAMMATION OF THE KIDNIES.

Nephritis.] [Nephrite.

From the frequency of this complaint among horses, and from its fatal tendency, the consideration of it becomes an important matter; and it is rendered still more so, from the proper treatment not being understood by the common class of farriers. It has been said, that mares are more liable to it than horses, and that horses are more prone to inflammation of the neck of the bladder: but my experience has not justified this observation. Small as these organs are, they are very essential to life, and the quantity of blood passing through them is very great; therefore, we cannot wonder at their aptitude to inflame, nor the great derangement inflammation occasions in the machine when they are so.

Symptoms.—The complaint is usually first observed by the animal being dull, and expressing pain by looking at his flanks; the urine is made in small quantities, and is often red or bloody. As the inflammation increases, it becomes in some instances almost wholly suppressed. Sometimes, although the urine be suppressed by a sympathetic consent of parts, frequent attempts to stale are made, when the mucous secretion from the bladder and urethra only are pressed out. The pulse at first is rather hard and frequent, and somewhat full; but as the disease advances, it becomes smaller, oppressed, and intensely quick. The animal stands with his legs wide apart, as though going to stale, and shrinks when the loins are pressed. If it be an entire horse, the testicles are alternately drawn close to the belly by the cremaster muscles, and alternately pendulous and relaxed. To distinguish it from inflammation of the body of the bladder, or from that of the neck of that organ, the horse should be examined by passing the hand up the rectum; when, if the inflammation exist in the kidnies, the bladder, whether empty or full, will not be hotter than the surrounding parts, nor more tender: but should the affection be confined to the body of the bladder, it will be surely found empty, but very hot and painful to the touch: if again, the neck of the bladder, as sometimes happens, should be the seat of the disease, the heat and tenderness will be considerable, and the bladder will be found distended with urine. During the continuance of the complaint, the horse shews a great disinclination to move about, the hinder extremities swell, and, what will often characterise the disease, is their aptitude to become paralytic and cold; and if one kidney only be affected, one leg only has been found paralysed and swelled *.

* The following strongly marked case I have selected from among others noted by me, because it was one purely nephritic, and which, from being in my own infirmary, I had peculiar opportunities of noting: nor do I conceive it irrelevant here, because it is a simple detail of facts, and, as such, a clear guide to future discrimination. A very valuable horse, the property of John Inglis, Esq. was sent to my infirmary on the 24th of January, 1807, having been unwell since the 21st, with what was considered by the groom as a common cold; and as such it had been treated. He was so ill when he arrived, that my remark to the servant who brought him was, that I doubted whether he was not come to his last home; but so unconscious was this person of his situation, that he had ridden him from his master's stable, a distance of three miles. The animal was immediately bled, and put into a loose box, where he appeared very uneasy and in considerable pain, but he never was observed to look towards his loins, or give other indications to shew the seat of the disease. There were great thirst, beating at the flanks, some cough, with frequent inclination to make a small quantity of water, after which some blood usually followed; but this appearance did not last more than two or three days, while the small evacuations of high-coloured urine continued throughout. On the next day after his arrival his pulse was 110, he exhibited a great dislike to the smallest motion, the near hind leg and thigh became cold, swelled enormously, and, by the third night, was completely paralytic; and it is remarkable that the near fore leg was also more cold than the off. So completely was the mobility of this hinder limb destroyed, that the poor animal never once changed his position, or attempted to lie down during the twelve days the disease lasted. On the 30th of January, this affected limb, however, returned to its pliancy, warmth, and capability of voluntary motion; but the off hind leg immediately became affected in a similar manner to that in which the near had been, and remained in that state for twenty-four hours, when the swelling and paralysis as suddenly again left it, and resumed its station in the near or left hinder leg and thigh, and remained stationary there until the death of the animal, which took place on the 6th of February. About four days before this, a considerable remission of symptoms took place, and I entertained hopes of his recovery; but this fallacious appearance lasted only a few hours, when he relapsed into a more aggravated state of disease; the pulse became irregular and hardly discernible, delirium came on, and death closed the scene.

The treatment pursued had been active, and, I believe, judicious; bleeding had been pushed to a considerable extent; care had been taken to introduce no diuretic into the system, and external stimulants were actively employed; but from the first no benefit appeared to follow any part of the treatment: the complaint was fatally obstinate throughout, and such I have commonly found to be the case, when, unmindful of an incipient affection, a horse has been ridden some distance, and perhaps exposed to cold when ill, as happened here; for, though he was found to be unwell on the 21st, he was imprudently ridden both on the 22d and 23d some distance, during two wet days, and, even on the 24th, he carried the servant who brought him up to me.

After death a very careful examination was made of the morbid appearances: less *general* inflammation was apparent than is common in horses who die of inflammatory affections of any of the abdominal viscera, which, in general cases, participate throughout more or less. The lungs, it was remarkable, had been early inflamed, and still bore some slight marks of the affection: indeed, I am disposed to believe they were the primary objects of attack; and that the injudicious riding on the 22d and 23d had translated the affection from them to the kidney, by metastasis. The left kidney only was diseased; but in this, the inflammation had been so great, that it had become gangrenous even to a state of absolute solution. The right was but little affected; though there is no doubt but that, on the 30th of January, a metastasis had taken place, and that the disease had been translated from the left kidney to the right. The remaining viscera, as before mentioned, were healthy, and the inflammation had communicated itself to the parts

The disease may terminate by resolution, by suppuration, or by gangrene. In *resolution*, which is what we should always aim at, the secretion of urine becomes increased, and of a thick whitish appearance; the pulse rises, the pain lessens, and a cessation of the other symptoms of fever occurs; the extremities also return to their usual size, pliancy, and mobility. *Suppuration* is, in the horse, not a frequent termination; the strength of the vascular system in him tends rather to produce *gangrene*, when the inflammation is very great; which termination is announced by the increased debility, by the weakness and intermission of the pulse, accompanied with cold sweats.

The *Causes*.—It is probable that it may sometimes arise, like the other topical affections, from a translation of general fever to these glands. It is more generally brought on from severe exercise, particularly if aided by the motion of a heavy or unskilful rider. It may be occasioned by the imprudent administration of acrid diuretic substances, particularly of such as are long continued. The application of cold is also not an unusual cause of it, as I have witnessed in horses turned out to grass without caution; nor is it uncommon for it to follow a cold wet tempestuous night, even among such as have been out to grass before; the cold water lodging on the region of the loins appearing peculiarly hurtful to horses.

Mode of Treatment.—There are some circumstances in the cure to be particularly attended to, but which have been passed over unnoticed by our best English authors; on the contrary, many of them have recommended a practice almost certainly destructive*, by ordering different diuretic substances, which, from the difficulty that already exists in the vessels to separate the watery parts from the blood, it is evident must greatly aggravate the complaint.

As soon as the disease appears, bleed plentifully to the amount of four, five, or six quarts, according to the size, age, and strength of the animal; which, if the symptoms do not give way, repeat in four or five hours; and should the disease still remain violent, a farther bleeding should not be neglected. After the first bleeding, empty the bowels by raking, and afterwards by a clyster; and if there have been any appearance of costiveness, a purgative containing no diuretic substance should be given by the mouth also; and when the bowels are opened, clysters of gruel, or warm water, should be still constantly applied, which will act as a fomentation, and tend greatly to relieve the complaint. It is very necessary here also to excite an external inflammation over the loins, but we are much confined as to the means of doing this; for the use of Spanish flies is here inadmissible, from their disposition to become absorbed, and to pass unchanged through the blood, until they get into the kidnies, when they exert their stimulating effects, evidently in this instance, to the extreme prejudice of the animal. Tur-

around less than usual. The paralysis evident in this and other cases may be accounted for, by considering that the inflammatory affection extended itself to the iliac nerves, which are situated in the immediate neighbourhood of the kidnies, and which nerves furnish the hinder extremities with nervous influence.

* Bartlet copying from Gibson, and treating of this disease, directs that if the secretion of urine should continue suppressed, to give nitre, turpentine, myrrh, and balsam capivi. Now, as the suppression arises from the continuation of the inflammation, this stimulating treatment would probably urge the kidnies into immediate gangrene.

pentine, for the same reason, should not be used; but no such fear prevents the use of scalding fomentations, or of a hot iron drawn over the back, or of any diluted caustic: neither can any objection be formed to the application of a simple mustard poultice without turpentine, which may be renewed every two hours; and, if the poultice be applied upon a newly stripped sheep skin, it will increase its activity *.

We have before had occasion to point out the great connexion which subsists between the skin and the kidnies, and to shew that when one is in a high state of action, the other secretes less; this being the case, it will be evident, that whatever determines the blood to the skin, or, in other words, whatever excites perspiration, must be highly useful: but it must not be forgotten, that this secretion is very difficult to excite, and that the exhibiting such medicines as would tend to produce active diaphoresis, would increase the action of the heart and arteries too much. In such a case mildly, and mildly only, nauseating the stomach by means of aloes, or by the white hellebore (see p. 385), might be advantageously practised, both to lessen arterial action, and also to promote a relaxed state of the skin. Clothing of the horse hotly should be avoided, but the legs may be bandaged up, plenty of litter allowed, and the stable kept moderately warm. Diluting liquors are inadmissible, on account of the distention they produce, for which reason the animal should be allowed but little to drink. And should it not be deemed advisable to try the full nauseating plan of subduing the inflammation, give the following :—

Powdered white hellebore	two drams
Tartarised antimony (*emetic tartar*)	one dram
Powdered opium	one scruple
Acetated liquor of ammonia (see *Mat. Med.*) ..	four ounces
Camomile tea	eight ounces.

Mix, and give every six hours.

—

Inflamed Kidnies *in* Neat Cattle.

Red water, which is the cowleech's and grazier's name for inflammation in the kidnies, is still more common among horned cattle than it is among horses: in them it is sometimes primary, and, at others, connected with an inflamed bladder; while again, in some cases, I have observed it accompanied with an affection of the bowels also. Graziers attribute it to low damp situations: and in many instances it seems brought on by drinking impure water, particularly that which is found in peat mosses. These varieties make it not a little complex to the common practitioners: indeed, these cases are in general to them wholly incomprehensible, for one only circumstance arrests their attention, which is, that the afflicted animal has a difficulty in voiding the urine; and they immediately attempt to overcome this obstruction by forcing diuretics. In a celebrated publication on cattle we find, when treating on this disease, a quart of infusion of *pellitory* is directed to be given two or three times a-day. Mr. Clater recommends *camphor*, *oil* of *juniper*, and *salt* of *tartar*. By such stimulating means, these inflammatory affections were very commonly pushed into gangrene; and

* A very active external stimulant may be made by macerating the croton tiglium in spirit, either of turpentine or of wine. (*See Blisters, Mat. Med.*)

a disease that under proper treatment might have proved manageable, has been by this injudicious conduct rendered fatal. If the physiology of the kidnies be attended to, as fully laid down in treating of the anatomy of those organs, it will be found that all diuretics act by forcing a greater quantity of blood through them; and, as inflammation also principally acts by increasing their vascularity, so the action of the intended remedy and of the disease are one and the same.

The *Symptoms* of this complaint in neat cattle are the same as in the horse: the urine at first almost suppressed, soon becomes bloody, from whence its name: and as the disease advances, particularly if it terminate fatally, the urine becomes darker and of a brown hue.

The *medical Treatment* of cattle nephritis is little different from that directed for horses: bleed largely, according to the state of the animal and the duration of the disease, and, if there be considerable marks of fever, give antimonials, but no nitre. The following may be tried:—

No. 1.—	Antimonial powder	half a dram
	Powdered ipecacuanha	one dram
	Powdered camomile	three drams.

Make into a ball with honey, and give twice a-day.

I have likewise seen this complaint exist in cattle in a less acute form, so as to last some weeks, sometimes originating in over driving or blows across the loins, and not unfrequently from the effects of difficult calvings. In these more chronic cases there is seldom any necessity for bleeding: a warm charge applied over the loins is very proper, and the following drink may be given every morning:—

No. 2.—	Powdered catechu	two drams
	Mucilage of gum arabic	four ounces
	Lime water (see *Mat. Med.*) . . .	six ounces.

In such instances a change of diet also is often useful: I have seen great and immediate benefits arise from being fed wholly on carrots.

Sheep now and then have *red water* also, both of the acute and the more chronic kind: bleeding, housing, and feeding on any sweet root, as carrots, parsnips, or in default of these upon turnips, form the best means of cure, with the occasional use of one-third of the medicine No. 1, if the inflammatory symptoms be violent.

INFLAMMATION OF THE BLADDER.

Cystitis.] [Inflammation de la Vessie.

The bladder may become inflamed throughout its whole body, or the affection may be confined to the neck of it only; and as different symptoms arise as either the one or the other of these are the immediate seat of disease, so we shall describe them separately. There is reason to believe, also, that the bladder itself may be the subject of two varieties of inflammation; that is, its *peritoneal* coat in some cases, and its *villous* in others, may be the seat of the affection: but the former is usually the effect of some general abdominal inflammation; while the latter is a primary affection, and is that which we mean to describe here.

Symptoms.—When a mucous membrane is inflamed, it ceases to secrete mucus; this takes place in the inflammation of the internal coat of the bladder, and when it ceases to secrete the mucus that was to defend it from the acrimony of the urine, it then becomes acutely irritable, and is constantly endeavouring to rid itself of the irritating contents. This complaint may be distinguished from inflammation of the kidnies, by what has been said with regard to that disease; and from inflammation of the neck of the bladder, from what follows.

As the inflamed bladder cannot long retain its contents, so there is a frequent evacuation of a small quantity of urine; and, on passing the hand up the rectum, the bladder will be found hot and tender, but empty; the horse is also commonly observed to have a disposition to dung frequently, as well as to stale, from the sympathy of the rectum with the bladder. The fever is usually considerable, and the pulse at first is harder and fuller than natural, but as the disease proceeds it usually becomes oppressed. Its *Causes* may originate in the translation of fever, perhaps sometimes by cold alternating with heat; and it has been occasioned in mares by the passing some irritating substance up the urethra to make them horsy.

Prognosis.—It may terminate by resolution; by an increased secretion of mucus; or by gangrene; the first of which is the most favourable, and the latter fatal. We must be guided, therefore, in our opinion, as the symptoms tend towards either of these terminations.

Cure.—Bleed according to the height of the fever and state of the pulse, and repeat as these indicate; the rectum also should be immediately raked to empty it. Throw up clysters of warm gruel, or water, to foment the parts; and as soon as one returns, throw up another. It might not be improper likewise, if the subject be a female, to pass up the urethra a decoction of linseed with gum arabic by means of a syringe, to sheath the bladder from the acrid urine. As in inflammation of the kidnies, avoid blistering with Spanish flies, but stimulate the abdomen in any other way externally. Every thing that increases the flow of urine should be avoided, as it tends to irritate the bladder. The body should be kept warm to encourage perspiration, and the internal medicines may be the same as recommended in inflammation of the kidnies.

Inflammation of the Neck of the Bladder.

Sometimes the neck of the bladder takes on inflammation alone, and this occurs more frequently to horses than to mares. It is to be distinguished from inflammation of the kidnies, because, in passing the hand up the rectum, the bladder will be found distended: this will also prevent mistaking it for inflammation of the body of the bladder. The frequent making of a little water will not, however, distinguish either of the foregoing complaints from this; as, in inflammation of the neck of the bladder, there is sometimes a small quantity of urine evacuated at different times: for after the bladder is distended, there will be, by the force of the distention, a few drops now and then squeezed out. But in this disease the frequent staling will not take place until the bladder be distended fully, whereas in the former disease it will come on at the very first: and likewise, in the latter case, the distended bladder may be felt even by the belly.

The *Prognosis* in this affection will be more favourable in a mare than in a horse; but it will be unfavourable in both if the stoppage continue obstinate twelve or fourteen hours.

In attempting a *Cure,* the inflammation must be subdued at once, if possible; but if not, means must be taken to obviate the present consequences. To promote the first indication, bleed very largely, open the bowels, throw up clysters, and stimulate externally, in the same manner as in the two last complaints. But if the inflammation do not subside sufficiently to permit the urine to pass, it must be drawn off by artificial means, or the bladder may burst; or the irritation alone may kill; or gangrene may come on. In a mare, from the urethra being large and straight, a catheter may be easily passed up, and the water drawn off: but, in the horse, to effect this, an opening must be made from the perinæum; yet this should not be done until the effect of passing the hand up the rectum and pressing on the bladder has been tried, which will often promote the expulsion: but when this and every other of the usual means have been ineffectually tried, proceed to attempt the introduction of a catheter by the perinæum. By referring to the anatomy of the urethra, or passage into the bladder, page 308, it is there clearly stated why no sound or other instrument can pass into this cyst at once from the yard: but when it becomes necessary to force open the neck of it, a sound must be first passed up the penis until it reaches the thin membranous part of the urethra in the perinæum *there described:* the instrument then introduced must be cut down upon, and a sufficient opening made to introduce a catheter: which must be done very carefully and gradually, as the resistance is sometimes considerable; so much so, indeed, in some instances, that no efforts are sufficient to overcome the contraction of the inflamed part; in which cases, to prevent the evils arising from the distention, we must proceed to puncture the bladder itself, which may be done by means of a trochar introduced within the rectum, and which opening will not, in that case, penetrate the peritoneal cavity. (*See remarks on this in the Anatomy of the Bladder,* page 299). It remains to add, that I have seen small continued doses of opium, as forty grains every two hours, greatly relieve this affection, and this in more than one instance: bleeding, also, till fainting was nearly produced, has relaxed the contraction.

Inflamed Bladder *in* Cattle.

This now and then occurs, though but very seldom. I have only heard it described, for I never saw the complaint; but it is evident that a corresponding treatment with that we have laid down for horses should be pursued.

INFLAMMATION OF THE WOMB.

This disease sometimes arises in *mares* a day or two after they have foaled, or at any time when abortion has taken place and they have slipped a foal. It is likewise not unfrequent in *cows,* under the same circumstances, as well as in *ewes;* and is frequently occasioned in all, from violence used in attempting the extraction of the foal, calf, or lamb.

It produces very similar symptoms to inflammation of the body of the bladder, and can only be distinguished from it by its happening at these times. There is usually the same frequency and pain in staling, from the bladder being affected by contiguity or sympathy, or from the pressure of the inflamed womb upon it. It is usually accompanied with shivering, marks of great distress, the extremities are cold, the pulse commonly oppressed, and the beast is much on the ground. Sometimes there is a flow of a coffee-coloured matter from the vagina or bearing.

It must be treated in a similar manner with inflammation of the bladder; but as the animal must have been previously weakened by the act of foaling, calving, or lambing, so the bleeding and general cooling plan should not be carried so far; nevertheless, if the inflammatory symptoms run high, and the subject be in full flesh, a proportionate bleeding must not be neglected. The bowels should also be opened first by raking, and then mild clysters must be frequently thrown up of a tepid temperature; and, in this instance, a purgative of Epsom salts is particularly indicated. Sometimes the bladder also becomes inflamed and irritable; at others, the neck of it only receives the affection; in which latter cases the urine must be drawn off by a catheter to relieve the distention (*see the last article*). Foment the belly at its posterior part with hot water, and support the strength with gruel or other nutriment; and in case there appears great irritation of the bladder, by the extreme frequency of the evacuations of urine, give opium in small doses united with antimonials, or the following:—

Tartarised antimony (*tartar emetic*)	one dram
Powdered opium	one scruple
Camomile tea, made strong, ...	eight ounces.

Give this drink every four or six hours: if to a *cow*, put only half the quantity of emetic tartar; if to a *sheep*, only one-sixth of the quantity. In all other respects the treatment, whether for the one or the other of these subjects, must be the same; except that the artificial habits of the *mare* make it more necessary to keep her warm.

It remains only to notice on the subject of this class of diseases, that the pancreas, the spleen, the omentum, and indeed any of the contents of the abdomen, may, and occasionally do, become the seat of *primary* or *idiopathic inflammation;* but these instances rarely occur in the horse, and still more so in the ox or sheep: that they become secondarily so by participation with the inflammations of the larger viscera, we have constant proof. In the event of a primary attack, the proper treatment will not differ from that laid down for the other viscera of the abdomen

CLASS III.

INFLAMMATION OF MUCOUS MEMBRANES.

CATARRH, OR COMMON COLD.

Catarrhus.] [Morfondure.

THE disease I would describe here is common catarrh, without the epidemic character it occasionally assumes. We have daily proofs that stabled horses are very liable, in the language of horsemen, "to take cold" by change of clothing, by the vicissitudes of climate, and from the alternations of different temperatures with each other. Common catarrh, or the ordinary colds of horses, in no respect differ from that already described, and consequently they put on the various appearances of cynanche tonsillaris when the mucous membranes of the throat and fauces are inflamed: and when the affection extends over the larynx and trachea, it has been considered (but I think erroneously) as cynanche tonsillaris by one of our best veterinary writers *. In very young subjects catarrh often brings on strangles, in which instances it bears the characters of cynanche parotideæ: and lastly, when catarrh attains a great degree of malignancy, the characteristics of cynanche maligna are present.

* Mr. Percivall appears one of the first who has introduced cynanche trachealis into our nosology, but with what justice as a standard disease, future pathologists must judge. The human croup has peculiar and distinct characters, defined by its raging occasionally as an epidemic; by its being almost wholly confined to very young subjects; by its being a primary attack, wholly confined to the mucous surfaces of the larynx, trachea, and bronchiæ; and is secondary, or continuous only, to the measles, scarlatina, or cynanche maligna. I would ask the observant veterinarian, whether he acknowledges these characters in any known disease in the horse? As a common inflammation, diffused over the extensive surfaces of mucous membranes, in contiguity or continuity; those of the nares, fauces, tonsils, in fact, the whole of the pharynx, the larynx, the glottis, the trachea, and bronchiæ, may participate wholly, or in part, in various degrees and modifications of catarrh, and they frequently do so: but I and others regard the human croup as an inflammation *sui generis*, in causes, symptoms, and consequences, differing from any other known inflammatory affection. If it were of the ordinary nature of inflammations attending mucous surfaces, we might expect to find tracheal concretions, as in croup, at all ages, and under every circumstance, liable to produce increased vascular action over these parts; which we know to be daily obnoxious to inflammation of the ordinary kind, but without ever producing true cynanche trachealis. Mr. Percivall further appears to regard this disease as so frequent and important in the horse, that he considers "the proximate cause of roaring is grounded in *cynanche trachealis*." Mr. P. acknowledges that "the inflammation here does not put on that *type* which makes croup so formidable and dreaded a malady in a human being: nor is it confined to immaturity." Might he not have added, that this *catarrhal symptom* in the horse (for I believe it will be found to be nothing more) never proves fatal, *per se*, by one continuous coagulable layer over the attacked surfaces? Membranaceous portions are never coughed up; and lastly, roaring, the common product of this æquine complaint of Mr. Percivall's, is happily never *left* to the human survivor of this perilous disease. I differ, however, from Mr. Percivall in this matter with some diffidence; for he appears to have bestowed a peculiar portion of his attention to it, and his lectures on the subjects of *wind affections*, to use the horsemen's phraseology, must be regarded altogether as admirable performances, and as the very feather in the cap of his work.

In its usual mild form, catarrh produces some little defluxion from the nose and eyes, a little staring of the coat, some cough, and perhaps less anxiety after food than usual, but rather more after water. The *treatment* required is, care in avoiding exposure to currents of air, substituting bran mashes or green meat for corn, with the nightly exhibition of the following powder in a mash:—

Tartarised antimony *(tartar emetic)*	two drams
Nitrated potash *(nitre)*	three drams.

If the cough be troublesome, bleed; and in case the complaint assume a more formidable appearance, treat as directed under epidemic catarrh.

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The *hoose* in cattle is nothing more than an accidental *cold* taken; for the cure of which they should be housed a few days, and have grains or mashes, with the above powder, giving to them only one quarter of the quantity of emetic tartar.

DISEASES
OF THE
PULMONARY AERATING PASSAGES,
Known by the Popular Names of
ROARING, CHRONIC COUGH, THICK WIND, AND BROKEN WIND.

Roaring.

As whatever at all obstructs the respiration of the horse, tends by common consent materially to deteriorate his value, and actually to detract greatly from his utility; so these deviations from a healthy state are most important subjects to the veterinarian. Mr. Percivall has laboured hard to remove the veil which obstructs our views of the causes of these evils; and if his success in discovering a remedy for them had been equal to his ingenuity and industry in searching for their origin, the veterinary art might have hailed him as her favoured son. As it is, the veterinarian must acknowledge his obligation in having much of the obstructing matter removed from the Augean stable. The various situations in which a morbid change takes place in the air tubes, has given rise to distinctions in popular language unnecessary to enlarge upon here. *Roaring*, which is a principal one, is a mechanical obstruction* to the passage of the air to and from the lungs, which exists in some part of the larynx or trachea, but is usually confined to the latter. The forms of this obstruction are various, according to the causes which have given rise to it, the length of

* Roaring is so perfectly a mechanical impediment to perfect respiration, that Mr. Coleman, I believe, says it occurs principally in the best winded horses. This very obstruction, however, by exciting the parts to increased efforts to inhale and expire air, may lay the foundation of future disease. Mr. Percivall relates a case of a horse belonging to his father, where the roaring was so great in degree, that humanity directed him to be destroyed: no alteration was to be found in the trachea, but the lungs were under sufficient disorganization, being, as Mr. P. expresses it, completely hepatized. From this case it would seem as though roaring can be produced by other causes than mechanical impediment in the trachea.—*Lectures*, vol. ii, p. 256.

its duration, &c. &c. In some instances, a deposit of coagulable lymph is spread over the larynx, the remains of former inflammatory affection of the parts, producing *wheezing;* in others, it more particularly constringes the rima glottis, in which cases a *whistling* sound is heard, when the horse is constrained to respire unusually quick or forcibly. In a few instances the general calibre of the trachea suffers contraction by concretions over a considerable portion of its surface: but much more frequently roaring is the effect, either of a local deposit of adhesive matter, or it consists of a corrugation of some particular portions of the internal membrane, thickened by inflammation and rendered hard by additional concretion. This is sometimes found in the form of a band stretched across the tracheal tube; at others an internal ring simply diminishes its diameter, when, if the remaining opening be uniform, the horse rather *pipes* than roars, as I have observed in the dissection of well marked pipers. The obstruction is sometimes so considerable as to excite the sound called roaring on the slightest exertion. I have seen the tube diminished to one-third of its original size. In general cases, however, roaring is only exerted when forcible inspirations and expirations are made; for it is in most cases*, as I have fully proved, equally produced by the one as by the other.

The *Causes* which occasion *roaring* are more numerous than at first sight the veterinarian even would suspect. Inflammation may be ranked as the foremost. Whatever either primarily or secondarily tends to excite arterial action here, may end by an effusion of coagulable matter, which becoming organized, remains as a permanent obstruction to the passage. Pneumonic affections and catarrhal ones are particularly liable to produce roaring; therefore, strangles also, by occasioning very general inflammation of the surrounding parts, is not an unfrequent cause of it. Occasional abscesses, besides those consequent to either strangles or catarrh, occur in the throat, and leave behind them by their effects the disposition to roaring. Mr. Percivall has also specified a cause of roaring which I have not myself noticed, but which I think by no means unlikely sometimes to occasion it; which is the custom of reining-in harness horses so tightly, to produce incurvation of the neck and elevation of the head: and Mr. Sewell informs us, he thinks that the practice of using tight throat lashes or neck straps may lead to it. In furtherance of which opinion it may be recollected, that horsemen have a very general supposition that cribbiting ends in roaring, in thick or in broken wind. May not the tight collar strap also here tend to the former of these affections? The custom of coughing horses so brutally, certainly must be likewise injurious. An unsightly horse is led from fair to fair, and perhaps his unfortunate throat is compressed in the rude gripe of brutal *copers* thirty or forty times each day. Is it to be wondered at if inflammation take place, and adhesive deposit follow?

The *Treatment* of roaring is very uncertain, or rather it is almost certain that no medical means will remove the affection: but the vete-

* Mr. Percivall describes a preparation in the Woolwich Museum, where the posterior part of the air tube was intersected by a cross band of adhesive matter, with an outer space divided in two, each of which admitted a walnut only; the other was contracted to the diameter of a hazel nut. As may be supposed, the subject, during life, laboured for breath, and when "but moderately exercised, roared aloud."

rinary surgeon will often be called on to do something. If he could detect the actual existence of the obstruction, and its precise situation, it is possible that he might be successful in operating a division or removal of it, as has been successfully practised in one or two instances; but the extreme difficulty of detecting the exact situation of the obstruction, will prevent its being generally used. In a very recent case blistering might be tried; but other remedies afford little or no chance of relief.

Chronic Cough.

Coughing, considered as an action generally, is a violent effort of the diaphragm, intercostal, and abdominal muscles, producing a forcible expiration of the air from the chest, with such violence as is intended to remove any extraneous body that may intercept the free passage of the air. Whenever it accompanies a general affection of the constitution, it is regarded as simply *symptomatic*, and the original disease is attended to for its removal. Thus catarrh and pneumonia are frequently accompanied by a cough, but we attend principally to the inflammatory state of the general circulation, as the best means of subduing it. A chronic cough is no less symptomatic of some affection of the air passages, yet as it is the only prevalent symptom, the mitigation of which removes most of the ill effects of the complaint, so in this instance, though we do not neglect the cause, we attend to the cough also. Chronic cough is a very usual attendant on thick wind, and on broken wind: it likewise accompanies glanders and pulmonary consumption. Worms also within the stomach and bowels are productive of a fixed cough. But besides these, there exists at times, without any attendant difficulty of breathing, the horse eating well and thriving, a permanent cough, usually more considerable in the morning and evening, after meals, and on any violent exertion, particularly also on first going out to exercise. A cough of this description is very common, and it will remain in this state, without otherwise affecting the horse for years, sometimes even his whole life. In other instances it does not end in so harmless a manner, but upon any occasional cold taken becomes aggravated; at each cold becoming worse and worse, till at length, by repeated attacks on the bronchiæ, which in this instance become congested and thickened with coagulable matter, the wind is at last affected. The effects and termination of chronic cough are dependent, in a considerable degree, upon the cause producing it. From what has been said of the terminations of pneumonia and peripneumony, it will be seen that an irritable state of the bronchial passages often remains after that disease, as well as after the catarrhal affection: in which cases any change of atmosphere excites these irritable parts into action; thus the horse coughs whenever he moves out of, or into, the stable; for the air inspired is either colder or warmer than what was before breathed, and hence becomes a source of irritation. Drinking cold water produces the same effect, for a similar reason. Any hurry or irregularity of motion does the like, because it propels more blood towards the chest, which cannot bear the increased stimulus. In some cases the irritability of the bronchial membrane itself does not seem so much increased, as that the mucus secreted from it appears altered, either in quantity or quality. It may become inordinate in quantity, as is often observed, and such horses, when they cough, throw off much of it by the nose: or it may be more acrid in quality, and hence by these means prove a source of continual irritation: or it may be lessened in quantity to the injury of the passages. In other instances, the inflammation arising from catarrh or peripneumony appears to have deposited thin layers of adhesive matter within the trachea and bronchiæ, which do not afford sufficient mechanical obstruction to produce either roaring, wheezing, or impeded respiration; yet prove a source of irritation, and produce cough. That such is the case, we know by what now and then occurs after such inflammations, in which the cough continues some time until these layers become absorbed, or be forced up by the violence of the cough: and it is by assisting the separation of this deposit, that expectorants act in relieving this complaint.

The *Treatment* of *Chronic Cough* must depend on our view of its causes and consequences. When it appears to arise from a want of mucous secretion, expectorants which excite such secretion are premised, as No. 1. When a redundancy of the mucous secretion is apparent, tonics are required. When the secretion is acrid, give No. 2. The cough, which is the effect of an irritable state of the parts, is sometimes relieved by stimulating the throat externally, and by giving internally opium with bitter tonics. (*See Mat. Med.*) In horses naturally of full habits, and otherwise living high, without much exercise, and feeding foully, our attempts must be directed to lower their general plethora, by bleeding, exercise, and more moderate feeding. If at grass, a less luxuriant pasture should be chosen. In the stable, such a horse should be muzzled at night to prevent him eating his litter, and his water should be given in moderate quantities only: all sudden exertions likewise should be as much as possible avoided.

I have frequently seen chronic cough benefited by a course of mercurial physic; but the cough in such cases was probably dependent on worms: and, whenever a continued cough exists, with irregular appetite and unthrifty coat, stools fœtid and slimy, at one time loose and another hard and dry, it is more than probable that worms occasion the affection. (See *Worms*). In all chronic coughs the best effects sometimes follow from feeding with carrots. Turnips, parsnips, beet, and potatoes, may be beneficially used where carrots cannot be got; and a mash with bran and linseed, or malt, may be occasionally given. In cases of chronic cough, where it may be suspected to be dependent on coagulable lymph deposited within the trachea or bronchiæ, the rubbing in of mercurial ointment its whole length, for a week, would be advisable, and then to blister the like extent of surface.

No. 1.—	Submuriate of quicksilver (*calomel*)	one scruple
	Gum ammoniac	two drams
	Balsam of Peru	one dram
	Powdered squill	one dram
	Horseradish, bruised	two drams.

Make into a ball with honey, and give every morning fasting. In some cases the following has been found efficacious:—

No. 2.—	Tar water (see *Mat. Med.*)	half a pint
	Lime water (see *Mat. Med.*)	ditto
	Powdered squill	one dram.

Mix, and give every morning. To either may be also added, with benefit, in some instances, as an additional expectorant, one or two drams of *tartar emetic.*

Thick Wind

Is also the common consequence of either acute or chronic pulmonary inflammations. Thus it frequently follows catarrhal and pneumonic attacks. In some instances, it is the produce of a more chronic or slow affection: in which cases it seems connected with or is dependent on general increased vascular action; for we find it more ready to take place in full plethoric habits, and in those which bring on this state by gross and great eating. I have observed it very common among short thick-set horses, particularly those of low breeding. Long continued and hurried exercise beyond the capacity of the lungs, is a common cause; and such is particularly the case when horses are driven or ridden hard on full bellies; and also when quick action is not proportioned to their condition. Confinement is apt to produce it, by exciting an inflammatory diathesis, and this more certainly when over-feeding is added to it. The remote causes of thick wind are, as stated, to be found in morbid vascular action. The proximate are more obscure, but the examination of morbid subjects, in most instances, shews some disorganisation in the structure of the lungs, or of the aerating vessels. I have, however, now and then been puzzled to point out any diseased alteration whatever. It is notwithstanding probable, that in such instances also the very minute cells were choaked with adhesive matter. It is commonly, but not always accompanied by a general thickened and deranged state of the substance of the lungs, formed from a morbid deposit in the parenchymæ; frequently in the form of little grains of a bluish substance. The most usual appearance, however, is a morbid alteration in the minute bronchial ramifications, occasioned either by a thickening of their own membranous structure, or by a deposit of coagulable lymph within them, by which their capacity becomes lessened. Some cases appear to me to be compounded of both these states; but the most frequent are those in which adhesive matter is deposited over the bronchial surfaces.

The *symptoms* of thick wind are sufficiently known to any one at all conversant with horses, and the rationale by which they are produced is not difficult to explain. The capacity of the air cells being diminished, renders it necessary for the air to be more frequently taken in; because, being acted on by a less surface, the blood is not sufficiently oxygenated; and a sufficient number of air cells not being expanded, a sense of fulness in the right side of the heart induces the animal to make hasty inspirations to remedy the defect, and consequently hasty expirations; the force with which these are operated, occasions the sound so well known as the distinguishing mark of thick wind. In this affection, the obstruction to both being equal, the inspirations and expirations are equal, which serves to distinguish it from broken wind, in which there is also no obstruction to the *entrance;* and therefore the breath is drawn in with its usual facility, but is *expelled* with difficulty. Thick wind is very apt to degenerate into that state termed broken wind: and here we are totally at a loss to explain how the change is brought about; we must, therefore, content ourselves with the fact that it is so.

The *treatment* of thick wind can seldom be more than palliative, as when once fully formed it hardly ever again removes. In very recent cases, bleeding, blistering the chest, or mildly stimulating the course of the trachea and bronchia, by mercurial frictions, to promote absorption, may be tried. The expectorant, No. 1, recommended for chronic cough, may be given also. The general treatment of the horse should be the palliative one recommended for broken wind. I have, now and then, witnessed benefit from repeated mild mercurial physic.

Broken Wind.

This incurable and peculiar affection has excited the attention not only of veterinarians but of the curious in general: and as a cure for it holds out the certainty of a plentiful harvest, both of credit and emolument, it has been a subject of much experiment and more conjecture. The older writers indulged in the most extravagant notions respecting it; one of which originated from observing that horses so affected have much flatus, and pass off much more wind per ano than sound ones: from this they concluded that some immediate communication existed between the lungs and fundament; and therefore they recommended an artificial opening or new anus to draw off the superfluous air; thus many an unoffending animal has been made to endure two evils instead of one. Gibson attributed it to an enlargement of the contents of the chest. Dr. Lower conjectured that it arose from a rupture of the phrenic nerve, which supposition seems to have been kept in mind by the professors of the veterinary school at Lyons, where late experiments on the subject have led them to the conclusion that broken wind has its origin in a reversed situation of the section of the diaphragm; which altered situation is dependent on a nervous affection of it. M. Godine, jun., veterinary professor at Alfort, considers it as a defect in the natural and relative proportions of the right and left sides of the heart. M. Demoussy, in a Memoir presented to the Royal Society of Agriculture of Paris, affirms, that by direct observation he has discovered that those districts of France, where hay or other dry food is most used, is subject in a peculiar degree to broken wind among their horses. *Rapport de la Societé Royal d'Agriculture, 25th Avril*, 1823, *p.* 10.—The theory which has been hitherto best received on the subject, originated with Mr. Coleman, who describes it as *a mechanical rupture of the air cells*. This opinion has been likewise supposed to be much strengthened by the appearances detected after death in the lungs of such subjects as had been affected with the complaint when living. The alteration in the structure of the broken-winded lung, in general, is very considerable. It has been asserted, that, in a very few instances, no change whatever has been detected. I have seen also lungs of broken-winded horses with but little morbid change; some little was however to be seen in every case which has fallen under my notice. This alteration consists principally in an emphysematous state dependent on air extravasated, not only throughout the parenchyma, in minute aerial bubbles, but also extended over the pleural covering in vesicles both large and small. This extravasation is, in most cases, so complete as to make the lungs specifically lighter than ordinary, and to make them crepitate and crackle under the hand *. They are also in every instance of a more pale colour

* See a well written article on this subject in Rees's Cyclopædia, wherein the

than natural, in some cases being almost white; which may be accounted for, either by the disorganization having injured their vascularity, or by its admitting more light through its gaseous cells*.

The invariable presence of emphysema in these cases being established, it becomes a most important question, whence this extravasated air originates? For some years I was so prepossessed with the opinion that *mechanical rupture of the air cells*, as ingeniously suggested by Mr. Coleman, would satisfactorily explain every phenomena met with, that, until struck with some irreconcilable discordances in the theory, I looked no further. Similar doubts have, I find, been entertained by others, resulting from the many difficulties which present themselves under this view. It remains therefore to inquire, Do equal difficulties exist, in a view of the matter, founded on a supposition, that instead of being received from without, this air is generated within the lungs, and is a gaseous fluid let loose by some chemical act of their own, effected by a morbid alteration in their functions? That a similar effect takes place in various parts of the body we have abundant proof. In many diseases emphysema is present, nor is any part exempted from the liability to a gazeous inflation. In the stomach and bowels air is continually forming on the slightest derangement of the digestive organs.

The morbid states which precede this formation of gas in the alimentary canal will also throw some light on our present subject, and enhance the justness of our views of the matter. Thick wind, as it is termed, which is very generally known frequently to terminate in broken wind, is also as generally known to be accompanied by indigestion, or by dyspeptic symptoms, characterised by thirst, greedy and irregular appetite, cough, and constant flatus. Between the digestive organs which furnish the blood, and the aerating which ameliorate it, a peculiar sympathy is known to be kept up by an especial nervous communication, which is so intimate and determined, that to derange the one is functionally to injure the other. Dyspepsia, therefore, is the natural consequence of either a lessened quantity or a deteriorated quality of the aerial fluid, of which we have innumerable proofs. Exactly in these states, under our view of the matter, are the pulmonary organs in broken wind. The extravasated air generated within the membranous substance of the lungs is necessarily in itself unfitted to perform any salutary effect on the blood; it also lessens the capacity of the natural cells destined to the reception of atmospheric air. This vital stimulus therefore being received in undue quantities, promotes, as a natural consequence, an unhealthy exercise of the digestive powers, and a train of dyspeptic symptoms follows. Now, were the air thus extravasated pure atmo-

dissection of a case of broken wind is very ably detailed, and the origin of the complaint satisfactorily traced to this source.

* Mr. Percivall appears rather sceptical on the subject of the emphysematous disengagement of air being the proximate cause of broken wind; and he grounds his objections on two cases, wherein emphysema was present in the lungs without broken wind. But as the cases stood, it is not easy to draw even this or any just inference on the subject: One was acutely affected with inflamed lungs, a state not unlikely to excite emphysema, particularly when approaching gangrene. The other was a more chronic case, but was so universally affected with visceral affection both of the thoracic and abdominal viscera, as to render it most likely to generate air in the disorganised state of the parts.

spheric air, received from without, and simply entangled by mechanical rupture of the proper bronchical cells, it would not occasion this train of symptoms, for it would first answer all the purposes of oxygenation; and the remainder would be absorbed or passed off as azote. We have also another proof that this air is generated by an act of the lungs themselves, in the circumstance that attempting the re-distention of these vesicles, or of the parenchyma, when the air has been pressed out by inflating the bronchiæ, totally fails.

A strong argument, however, in favour of mechanical rupture of the cells, appears at first sight to present itself, from the kind of horse which is more frequently the subject of spontaneous broken wind than any other. It is notoriously common among greedy, foul-feeding, and also among coarse, fat, low-bred horses. But a little reflection will shew that an argument equally in favour of the spontaneous formation of air in the lungs may be deduced from these facts: for the same connection between the digestive and the aerating organs here produces that effect in the lungs which was begun in the chylopoietic viscera; for they are mutually dependent on each other. Under this view we are at no loss to account for the phenomena of horses becoming suddenly broken winded without apparent illness or exertion, but quietly feeding in the stable or grazing in the field; but mechanical rupture is unaccountable in these instances. The irregularity in the urgency of the symptoms of broken wind renders it clear that there must be some other cause, besides one common communication kept up with the external air by rupture of the recipient aerial cells. On some days, broken-winded horses are capable of much exertion, and feel little difficulty in inspiration; at others, the affection is painful and distressing to them in the extreme if the least exerted. I have occasionally hunted a broken-winded horse, whose performances on some days surprised myself and those around me; at other times, I was forced to be a quiet spectator. It is said, that some breeds are more subject to the affection than others: this hereditary tendency, if true, also militates against rupture of the air cells. For one other forcible argument against extravasation of the atmospheric air, I am indebted to Mr. Percivall, who very justly remarks, if the extravasation follow mechanical rupture of the cells, how comes it that blood is never found effused? or that, in parts so vascular, they do not sometimes reinstate themselves, and cure the affection? which we know never happens. Neither would the simple distention of the stomach, seeing it so quickly subsides in the horse, according to Mr. Coleman's theory, account for the benefits which result in broken-winded cases from particular methods of feeding, or from particular articles used: but these phenomena may be readily comprehended by considering that some ingesta give a greater or less disposition to the formation and disengagement of gas in the lungs, as they do in the stomach and intestines; and that under this view it is possible that a cure may yet be discovered for this complaint. I leave this matter to the further consideration of the veterinary pathologist; but I leave it unwillingly, as it affords a fair and wide, and, as I view it, a satisfactory field for fuller investigation, did my limits allow it.

The *symptoms* of broken wind it is almost unnecessary to do more than mention. The cough which accompanies it is of a particular kind, and seems to be ejaculated with a sort of grunt through the upper part of the trachea, perhaps from a sympathetic connection with the parts below. Human asthmatic persons are frequently heard to emit similar sounds: and, during life, the symptoms of both complaints bear a great resemblance: but a morbid anatomy of the two differs greatly. The difference between the inspirations is most remarkable, but easily accounted for. Inspiration, or the act of drawing in the breath, is effected with the ordinary ease, and the favourers of the theory of mechanical rupture find a ready passage for it (as I myself did formerly) into the cellular tissue, by means of the ruptured cells; where, becoming entangled, it forms a difficulty to its expulsion. But it is probable, that the extravasated air already diffused through the cellular tissue, by means already explained, is still the real cause of this difficulty, by offering a resistance to the complete ejection of the atmospheric air contained in the bronchial cells. Thus the broken-winded horse inspires with ease, but expires with a protracted and great effort, by means of very forcible contractions of his abdominal muscles; the observance of which gave rise to the idea that the diaphragm was paralysed. The expiration is performed by two apparent efforts, in one of which the usual muscles operate, and in the other the auxiliary muscles, particularly the abdominal ones, are put on the stretch to complete the expulsion more perfectly; after which the flank falls with peculiar force, when these muscles resume their relaxations.

The *treatment* of broken wind, if its incurable characters continue confirmed, can be only *palliative;* but if it originate in a morbid tendency in the parts to generate air, I can see no reason to despair but that chance or research may yet discover a remedy for it. Whatever increases the distention of the vessels generally, as a state of plethora, or of the stomach and bowels particularly, aggravates the complaint by increasing the difficulty of distending the thoracic cavity. Besides, therefore, general attention to avoid stimulants, and to promote regular evacuations by the bowels, abstain from over-distention of the lungs by too violent and too sudden exercise. By carefully attending to these principal indications, a broken-winded horse may be rendered comfortable to himself, and useful to his owner. The food should be regularly given in moderate quantities only; but most particularly it should be of such a nature as will contain much nutriment in a small space: hence corn is more proper than hay, and, above all, I have found a manger food composed of one part bran, one part bruised beans, and two parts bruised oats, agree particularly well, given somewhat moistened, as indeed all the food given to a broken-winded horse should be. On a sufficient quantity of this food a horse will need but very little hay, and what he does have, should be of the oldest and best kind; and, when they can be got, carrots, chopped and mixed with the manger food, will often be attended with a salutary effect on the wind, particularly as it will render less water necessary. Indeed, food of this description, when it can be procured, may advantageously form the whole feeding of the horse. Turning out to grass commonly aggravates the symptoms of broken wind; but a daily run on a very short pasture is generally found advantageous in these cases, and a neglect of sufficient moderate exercise aggravates the complaint greatly: water should be sparingly given, and without this caution all the others are useless; whatever also is allowed should be given by measure, for if a horse, under this affection, be allowed to drink his fill at a pond, he will probably injure himself, so great is the greediness after water on these occasions, originating in a defective digestion. But this debarring from drink should never be such as to border on cruelty; neither is benefit derived from it, but the contrary. Four quarts may be given morning and noon, and six quarts at night; and when the exercise and perspiration are considerable, something more on that account should be allowed. As a medical treatment, it may not be improper to bleed when the occasional symptoms run high; and benefit has been received from daily doses of foxglove under these circumstances. I have also administered antimony and nitre with advantage. By judicious management, and the exercise of a little humanity in proportioning the work to the state of the disease, much may be done in these cases; and if the sufferings of this valuable animal are considered when a different course is pursued, I should hope that it is ignorance, and neither obstinacy nor cruelty, that dictates it.

Modes of distinguishing Soundness and Unsoundness of the Wind.

These various affections of the *wind* are very important to the veterinarian, nor can he be too well informed of the appearances that characterise each distinctly; because, as their existence affects the legal soundness of horses, so he will be very often forced to decide peremptorily on very slight appearances. With regard to *thick wind*, it is not every horse who heaves at his flanks that is permanently thick-winded: he may have an occasional cold or other ailment; the stable may be unusually hot, or some accidental cause, as alarm, &c. may have operated to produce it; of the probable existence of all or of any of which he should inform himself before he decides: but if, by strict inquiry, he can ascertain that, under every circumstance, and in the absence of every occasional excitement, the horse he examines breathes always quicker than natural, and is likewise heard to cough, he may safely decide that he is *unsound;* and this the more surely, if a brisk trot increases the heaving beyond what it would do in a perfectly healthy horse. With regard to the cough which often accompanies thick wind, and the permanent chronic cough without such present affection, a little difference is usually discoverable between them. Much stress is laid on the varieties in the *sound of the coughs* of horses by dealers and other persons about them, and it is with considerable justice that they are so considered. When a perfectly sound horse is *made* to cough, he is expected to produce a shrill whistling noise; and the effort seems to arise from the upper part of the neck; and there is little reason to doubt but that, in these cases of pressure of the hand on the windpipe to produce the cough, the muscles of the larynx act upon the part pressed on, and that such cough is more immediately produced of that determinate sound than at another time; and this is so certain, that a horse shall have an occasional cough on him that does not sound so pleasantly as a judge would wish, and yet, when coughed by pressure, he shall produce a satisfactory effort: for in the one instance he coughs naturally from the parts affected, which are the bronchial passages: and in the other from the upper part of the throat: that is, he contracts the larynx by the laryngeal muscles into such a lessening of its diameter, as shall produce a forcible rush of the air through the part, to displace the obstruction offered by the pressure. The sound emitted this way, therefore, is not altogether conclusive; nevertheless, a considerable dependence may be still placed on the *sound of the cough*, which should be, as before described, a light whistling expiration, giving a tracheal more than a pulmonic vibration, as though operated in the windpipe. There is also a firmness with fulness in the cough of a sound horse, and he clears his nostrils after it usually by snorting: while, on the contrary, in the permanent cough, and more particularly in that which betokens any actual affection of the lungs, the cough is deeper, as though the chest vibrated, and it is more deeply sonorous. *Roaring* may be immediately detected by a brisk gallop, but the person who is to judge of its existence should be on the ground, and the horse should pass him several times, but without restraint; for I have seen horses whipped into a momentary cessation of the roaring.

Broken wind can hardly be mistaken; the cough accompanying it conveys a peculiar sound; it is short, deep, and combined with a grunting effort, and which is more particularly observable on any sudden motion or surprise. Dealers hold up a horse's head, and then either strike, or pretend to strike, him suddenly, or kick him, which usually elicits this peculiar grunting sound. Such horses are also peculiarly flatulent, and break wind most frequently; but the principal feature in the case arises from the beating of the flanks. These, though much quickened in their action, are rendered peculiarly remarkable, by their operating in respiration or breathing by *three* efforts instead of *two*. In the first, the air is drawn in naturally, and the flanks fill up as usual: but in the next, the falling of the flanks, again to expel the air, is most unusual, for it is not done with a gradual sinking in of the muscles, but at once by a momentary effort, leaving a line across the flank: and then a third effort takes place, which is a slow but strong drawing up of the muscles of the belly to press out the remaining air entangled in the cells. Broken-winded horses are also observed to be peculiarly greedy after water; and a little hurried motion distends the nostrils, and produces evident distress.

SORE THROAT.

Cynanche Tonsillaris.]

Horses seldom have the tonsils and pharynx inflamed under some attacks of catarrhal fever, or of strangles: when, therefore, a horse is observed to sip his water, shaking it about with the lips, and readily inclining his head towards it, but with an evident fear of swallowing, it may be known that a soreness of throat is present; and the fact will be still more certain, if, after he has chewed his hay, he lets fall the chewed mass, which is termed *quidding* his food. As it is always connected with a febrile affection, so it can only be properly treated in conjunction with that. See *Catarrhal Fever*. It may seem to require an exception in favour of that which accompanies strangles; but the treatment will be essentially the same.

GLANDERS.

[La Morve.

This fatal and loathsome disease has long been the scourge of this noble race of animals, as it remains the *opprobrium medicorum* of the veterinary art; and there is yet reason to fear that some time may elapse before we shall find its antidote. It is not certain to whom it was indebted for its name of *glanders*, nor is its derivation clear; but it does not seem to have received any particular designation, either among us, or our neighbours the French, till the restoration of learning after the irruption of the Goths; for we find some of the French authors disputing what disease Vegetius meant, when he was evidently describing glanders under a term, which, translated, signifies *humidity* or *moisture*. He speaks of it as a viscid white matter running from the nose, of a bad smell, accompanied with moisture from the eyes; a haggard countenance, and dry harsh hair; it was added, that, when this running became bloody, the disease was incurable*. It is likewise described in similar terms in the celebrated work of Ruini, in 1618. The antients formed the most vague opinions relative to the nature and treatment of glanders, and with the older English farriers the absurdities lost no ground. De Gray says, a horse must be first cured of sundry complaints before the glanders can be removed, as consumption of the flesh and lungs, aches in the head, diseases of the liver, pursiveness, hide-bound, swelled legs, &c. Solleysel and Blundeville supposed its seat was the spinal marrow, which was wasted by its effects; others thought the brain was exuding through the frontal sinuses. Neither do Gibson nor Bracken appear to have formed any correct notion of it: the latter considered it as the remains of a cold, confining its attack to the glands of the throat, and denies its being infectious; directing, as a cure, *balsam copaivi*, *eggs*, and *white wine*; at the same time advising the use of stimulating injections up the nostrils.

Both the younger and elder La Fosse have immortalized their names by their efforts and success in ascertaining the true nature and cause of this complaint. In 1749, La Fosse the elder demonstrated before the Academy of Sciences in Paris, that the seat of this disease was wholly in the pituitary membrane, and he, therefore, proposed as a cure the injecting the whole surface of this membrane, by openings to be made with the trepan into the frontal, nasal, and maxillary sinuses. This memoir was translated into English by Bartlet, and the same experiment was made by various persons, particularly by Snape, farrier to the king; but I am not aware of the practice being carried to any beneficial results. La Fosse, jun., informs us, that the farriers of that time were enraged at the discovery, and, so far from endeavouring to examine into the truth of his evidence, they obstinately persisted in the antient opinions, that the seat of the disease was in the lungs, the kidnies, or the liver. In 1752, La Fosse senior presented another memoir to the Royal Academy of Sciences, in which he more fully explained his theory, and presented many new facts. In this treatise he

* A late author was not aware of this, probably, when he asserted that glanders and the venereal disease bore the same date in medical annals.

divided the disease into seven different species. The result of these discoveries went to prove, that the glanders was a specific affection of the pituitary membrane, affecting all the nasal cavities and its dependent sinuses; that though every appearance of mucosity from the nose was denominated glanders, two only were specific affections; and that the disease is so truly an affection of the pituitary membranes alone, that *any* inflammation of them, if long continued, may degenerate into it: hence he has seen fractures of the bones of the nose produce it; a long-continued catarrh likewise; the strangles may also terminate in it; and, lastly, as full proof, both himself and father have produced it upon a sound horse by acrid injections up the nose. It was the opinion of these authors, that this disease was only to be cured by local applications, and that those must be applied to the whole affected surface of the membrane by artificial openings*.

M. St. Bel, the late professor of our Veterinary College, likewise published his remarks on this disease; but it is evident that he knew little or nothing relating to it but what he gained from La Fosse, and consequently his opinions offered nothing new. Mr. Coleman, the present professor, has prosecuted the subject much farther, and, by an extensive course of experiments, has thrown very considerable light on the nature of the affection.

These researches have been followed up by enlightened coadjutors, and have made us aware, by direct proof, that glanders and farcy are dependent on a poison *specifically* the same; but that the *seat* of the one is not the same with that of the other. The experiments made have set this matter beyond doubt; for horses have been inoculated with the matter of farcy, and glanders has been the result: glanders has also been produced by inoculating with the matter of glanders, which M. St. Bel asserted could not be done: farcy has been brought on likewise by inserting the matter of farcy: and, lastly, the artificial introduction of the matter of glanders has occasioned a true appearance of farcy. It has, however, been inferred, that because these two diseases are so different in their situations, they must be essentially different in their natures; but in answer to this, had not even numerous experiments and established facts already set this matter clear, it might have been urged *à priori*, not only that every poison has its preference of situation, but likewise that the same poison, under different modifications, affects different parts. The first and secondary attacks of syphylis are very different, and the parts they affect remote from each other. The poison of the plague inflames the lymphatic glands, but it is by no means certain which of them it shall attack. It may not unaptly be added, that it is sufficiently notorious that farcy always proceeds in the course of the lymphatics, and observation has proved that glanders, when it produces ulcers, proceeds in the line of the absorbents of the nose. When the matter of glanders is introduced under the cuticle without occasioning a sufficient flow of blood to liquefy or neutralize the poison, a slight swelling is produced in a day or two, and in another day or two a purulent discharge takes place; after which the lymphatics of the part become inflamed and tumefied,

* Since this time, the French medical catalogues teem with treatises on the subject, most of which are either histories of cases, or theoretical disquisitions on probable modes of cure.

or "corded," as in farcy. The original sore now soon assumes the appearance of a true farcy bud or ulcer, and similar ones will also follow in the course of the absorbents: in short, the disease will take on every characteristic of genuine farcy. Soon after, matter begins to flow from the nostrils, the lymphatic glands under the jaw become enlarged, and every feature of perfect glanders also appears in full force. Exactly the same will occur, if the matter of farcy be used for the inoculation instead of that of glanders. Some veterinarians, notwithstanding their acknowledgment of these facts, still consider farcy as a local disease, because its progress is sometimes arrested by the extirpation of the tumefied lymphatic or farcied bud, but that glanders is a constitutional complaint, and incapable of local cure; but this opinion wants confirmation. Glanders appears also generated in the constitution; and it likewise follows as a consequence of other affections. Whatever keeps up a protracted purulent discharge from the mucous pituitary membranes is capable of entering into some new combinations, and of forming therefrom the true glanderous character. Thus it sometimes succeeds to catarrh and to pneumonic attacks, and also occasionally to strangles: it is said to have been brought on by wounds of the nose, and to have followed the use of acrid injections up the nostrils. A contaminated air is capable of producing glanders: thus it was found to be very common in the cavalry horses in the Peninsula war, from the unwholesome nature of the places used for stables. When the impurity of the air is heightened by close confinement, the disease has been known to put on an acute form. This has been found to occur among horses emaciated by a long voyage. In one instance, where the hatches of a transport carrying a dragoon regiment were fastened down in a storm, this acute form appeared, and, in three days, destroyed a third of the horses.

The contagious nature of glanders has been long a subject of dispute, but which is now settling into a pretty general conviction that it is so*: but the *degree* of its contagious character is still a matter of debate; nor without many authenticated facts recorded, and well conducted experiments made, shall we be able to form a decisive opinion on the subject. I formerly thought it more often engendered than caught; but an extensive experience has convinced me that it is more frequently brought on by contagion than engendered constitutionally. But although this is not without its interest, it is of much more importance to determine *how* the contagion is communicated, which has hitherto been differently accounted for, and is not yet satisfactorily explained. I have seen much of the disease in the army, and in private practice, and I lost no opportunity which presented itself for experimental enquiry, yet I could never satisfy myself entirely on this point. Experiments conducted with the utmost precision, and general characters, would lead to very discordant results. Mr. White's experiments go to prove, that the simple contact of glandered matter, applied to a surface neither abraded nor inflamed, will not produce it. It has even been put up the nose, and retained there, without occasioning any ill effect; and though this is in direct contradiction to what occurs

* M. Gohier, a well known veterinary author, and professor of the Veterinary College of Lyons, appears to have fully established the contagious nature of glanders by numerous well conducted experiments.

in the venereal virus, which will communicate its effects through the medium of any healthy mucous membrane, yet it corresponds with what I have observed; for I have also rubbed the matter on various parts of the body, and introduced it under the eyelids likewise, yet no ill consequence ensued: but on rubbing some glandered matter into the greasy heels of a horse condemned to the dogs, farcy soon appeared. On the contrary, Professor Peal, who is no mean authority, says "the glanderous matter is frequently conveyed from the nose of a diseased horse to one that is sound, whereby the effect of inoculation is most commonly secured."

The air has been supposed a medium for contagion, particularly the air of the stable; but this I always considered as very unlikely, and further experience has convinced me that the *air alone will not convey the contagion of glanders*. Mr. White informs us he had the opportunity of putting this to the test of experiment, by keeping a sound horse and an infected one in the same stable, but perfectly free from actual communication; the event was, that the sound horse received no injury from his diseased companion. It is, however, evident that it requires many direct facts of the same kind to establish the fact incontrovertibly: yet thus much even greatly strengthens the opinion formed: this gentleman further conjectures, that the general source of contagion arises from the glandered matter being received into the stomach; and the experiments and facts he details, make this appear not improbable, although it is much against the theory of the action of morbid poisons in general, which are seldom received by the stomach; and, unless we conclude with Mr. Peal, that simple contact with the matter will propagate the infection, it seems very difficult otherwise to account for its being so highly contagious as we know it to be; for we cannot for a moment suppose that every horse, out of the number of those who become affected, can gain it by inoculation; that is, by an accidental application of the poisonous matter to a sore or abraded surface. Future experiments, however, on a large scale can only determine this: in the mean time, what is known, and here detailed, will enable the veterinarian to give his preventive directions accordingly.

The *Symptoms of Glanders* are, an increased and diseased secretion from the membranes of one or both nostrils, which continually flows in small or large quantities. This discharge is seldom at first perfectly purulent, but is more glairy, thick, and not unlike the white of egg, and it sometimes continues thus for a long time; at others it soon becomes purulent, but even then there is always a degree of viscidity and gluiness in it that sticks the nostrils together, as it were, from its tenacity, differing from other pus, and which very circumstance strongly characterises the complaint. The general colour of the schneiderian membrane becomes changed: first to a violet colour, and afterwards to a leaden hue. As ulceration takes place, the discharge becomes bloody, sometimes sanious and offensive, which is always the case when the bones prove diseased. From an absorption of the morbid matter from the nose by the lymphatics of the part, the lymphatic maxillary glands under the jaws, through which these vessels pass, become swollen and tender, and, as one side of the head only is sometimes affected with the glandered running, in such case one lymphatic gland only is tumefied, and of course the one of the affected side. These glands are called *kernels* by the farriers, and their being enlarged or not enlarged is, with them, a criterion of the existence or non-existence of the disease: but though in long-continued glanders they are very generally enlarged, yet in mild cases they are not invariably so; and again, there are other complaints beside this that will tumefy them. The increased secretion from the inflamed membrane in common catarrh will sometimes do it; and the same occurs in strangles. Still less can any *certain* criterion be drawn from the circumstance of their being attached or detached from the jaw-bone, which circumstance is equally regulated by the nature of the matter absorbed; though, when they become much swelled in virulent glanders, they certainly are not so loose and free from confinement within the skin. Nevertheless, the enlargement of these glands, and their confinement to the maxillary bones, may serve as auxiliary proofs of the existence of the complaint, but must not be relied on as definitive proofs. The disease sometimes remains long without producing ulceration, and cases of this kind prove very puzzling to the practitioner: at other times, on the contrary, an ulcerating process quickly appears. The ulcers of glanders have a very peculiar character, and their appearance cannot be too attentively studied by the veterinarian: they are not unlike the venereal chancre, but usually commence by small limpid bladders, which soon ulcerate into a sore of a particular kind; and when there are several of them, they are always placed in the course of the lymphatics. Sometimes the ulceration exists so high up, that it is very difficult to discover them; yet, with the head held up to a full light, more particularly towards the sun when shining, they may be detected if within any moderate distance. Very great caution is likewise requisite in giving a prompt decision from the existence of an appearance of ulceration alone; for sometimes portions of the secreted matter will adhere to the nasal surface, and much resemble ulceration: and had not the error actually occurred in the practice of more than one veterinarian, I should be almost ashamed to insert a caution, that the opening of the nasal duct, which brings the superfluous moisture from the eyes, may not be mistaken for a chancre. The situation of the ductus ad nasum is towards the posterior and lower part of the nostril (see *p.* 220). As the disease advances, much of the surface of the schneiderian membrane becomes ulcerated, till at length even the bones prove carious. At an uncertain period of the disease, which occurs sometimes much sooner than at others, the lungs become affected, when hectic symptoms soon follow, with tubercles which ulcerate; frequent vomica also form and burst: there then appears cough, emaciation, and weakness in the loins; the hair feels dry, and falls off on being handled: the matter from the nose increases in quantity, becomes sanious, stinking, or bloody, and is coughed up by the mouth also, and in this state the animal dies.

From the very serious effects that follow the spreading of this disease, the veterinary practitioner is often called upon to give a prompt and definitive opinion relative to it: it therefore behoves the junior practitioner to make himself as familiar with the complaint as possible. The principal intricacy that will present itself, arises from the similarity of appearance that frequently exists between the true disease and an effect arising from long-continued or often repeated colds.

In present colds the difficulty cannot be great, for the general health is commonly affected; there is a loss of appetite, some thirst, and a cough, which seldom are seen in the early stages of glanders, and the more advanced states require but little to distinguish them: and though in colds the submaxillary glands are sometimes swelled, yet they are in these cases hot and moveable. But when colds have been often repeated, or have continued a long time, a morbid affection of the mucous membranes of the nasal cavities will sometimes remain for a considerable time afterwards, in which there will continue, though the animal may be otherwise healthy, to flow a quantity of thick and *apparently* purulent discharge from one or both nostrils. I have seen cases of this kind which have existed one and two years, and in one instance it had lasted three years, but eventually disappeared. Such morbid flux of matter is always the effect of former inflammations from cold, in which, though the original affection has subsided, yet it has left a disposition in the membrane to secrete inordinately; and as an *increased* and *undue* action, long continued, almost always alters the secretions, so it is not the true mucus of the part that flows, but a muco-purulent, or one which partakes of the nature both of pus and mucus. These cases may therefore prove particularly puzzling to the practitioner, and many other circumstances will often unite to increase his difficulties: little dependence, as one instance, is to be placed on the absence of ulceration, or, at least, of one within the reach of observation, nor on the unenlarged state of the lymphatic glands of the throat, unless indeed the disease be of long continuance, and then the absence of these characteristics will be a considerable criterion: but in the early stages it is very little so, for glandered matter will flow some time without ulceration being detected, even on careful examination; and still less will the presence of tumefied lymphatics ascertain the existence of glanders with certainty; for in some early instances there is none of this present; and again, on the contrary, there is no tumefaction which glanders can produce but may also be equalled by other circumstances: indeed, any thing passing the absorbents, foreign to the usual fluids taken up, may irritate and enlarge these glands; and they may be at all times swelled in six hours by injecting any acrid matter up the nostrils. In confirmed glanders they are, however, very generally not only enlarged, but they prove less moveable in their situation, and are almost fixed to the jaw; whereas, when the flow from the nose is only the effect of a former cold, they do not present much enlargement. With regard to the immediate discharge itself also, it usually presents some distinguishing characters, which, if attended to, will prove tolerably sure guides. It is generally tenacious and sticky, like glue; it is likewise semi-transparent, and hangs about the rim of the nostrils in a peculiar manner; but more particularly it is continually flowing: whereas in that state resulting from catarrh, there is not a regular discharge, but the flow appears now and then, as when the horse coughs, or when he occasionally *clears* himself by snorting; at which times a large quantity frequently comes away, and then perhaps no more appears for some hours after. And though the matter of glanders may flow some weeks even without apparent ulceration, yet in general cases there will occur a more early appearance of chancres, such as we have described. To all these considerations should be added, the general health of the animal; and some dependence may also be placed on the state of the hair, which I have always observed unthrifty and disposed to fall off in confirmed glanders.

In a case where an absolute necessity existed for a certain and early decision, it can, under every circumstance, be gained by the inoculation of a horse or ass of small value.

The *Treatment of Glanders*.—The philosopher's stone was scarcely sought for more earnestly by the antients, than a *cure* for the glanders by the moderns, by modern veterinarians at least. The great reward it held out has stimulated many practitioners into unnumbered experiments. With a laudable industry, Professors Coleman and Sewell have long engaged themselves in a wide field of experiment, and, I believe, with some prospect of success. That a cure may, however, be discovered for this specific poison, there is no reason from analogy to despair; but, on the contrary, much reason to hope: nevertheless one consideration, not usually taken into the account, would probably much lessen the value of such a discovery, which is, that it does not appear to be the glanders, as it affects the head, that destroys the animal; but as it diseases the lungs. Now, when these important organs become once affected in these cases, it is not clear that even the destruction of the glanderous virus would save the animal: on the contrary, there is every reason from analogy to conclude, that the lungs having been once ulcerated, let the cause be what it would, the pulmonary affection alone would run on to a fatal termination. If, therefore, we could even completely destroy the specific poison of glanders in the constitution by any means, unless it were done before the constitutional taint had been given to the lungs by absorption, or by translation of morbid action to them, it would be vain to hope for a permanent cure.

We have the authority of some of the best veterinary writers to strengthen our own belief in the curable nature of glanders. The celebrated veterinary Professor Chabert asserts his full confidence that it is so, particularly in its early stages. Messrs. Huzards, both elder and younger, do the same, with many others.

I formerly, in my own attempts to discover a remedy for it, first considered it as a local affection; and, as such, have tried numerous applications to the nasal and frontal sinuses, by trepan and powerful injections. Witnessing the inefficacy of this plan as a general one, I then altered my grounds, and attacked it from within, as a constitutional disease, by almost every active medicament in the Materia Medica. Many others have travelled over the same course, some with more persevering industry, but hitherto few have been led to indulge much hope, except the Professors of the Veterinary College, who, I am informed, are yet very sanguine on the subject. Many external applications seem, for a time, to benefit the complaint; the morbid discharge even ceases under some plans of treatment: but the internal specific action still goes on, and the discharge eventually returns. It is doubtful whether any *local* treatment will be found equal to the destruction of the morbid taint, except in the very first stages. Beyond this, it may be regarded as fixed by repeated experiments, that a long course of internal remedies alone can ever effect it. Of these the sulphate of copper (*blue vitriol*) stands in high repute, in such doses as the stomach will bear. The subacetate of copper (*verdigris*) has been much praised. Mild courses of mercurial medicines have been strongly recommended, from observing that however the more acrid preparations of the mineral, as the oxymuriate (*corrosive sublimate*), might appear at first to arrest the progress of the disease; yet that a sufficient continuance of it occasioned such disturbance in the system, as to prove equally noxious with the disease. Much dependance has been placed by some on the sulphates of iron and zinc, but the events have not borne out the hopes. Mr. Clark strongly recommends the daily administration of the following:—

Sulphate of zinc (*white vitriol*)	fifteen grains
Powdered cantharides	seven grains
Powdered allspice	fifteen grains.

Of the utility of this he produces two remarkable instances. I have only to add, that I have tried this, and every one of the above, with many other remedies; but the event has commonly been the same.

FARCY.

[Le Farcin.

From what has preceded on the subject of glanders, it will appear that these two diseases may be considered as modifications only of each other. Though the older writers were aware that one sometimes terminated in the other, yet they still considered them as two distinct affections; and this the more, as farcy was found sometimes curable, but glanders never. To prove that no such inference, however, ought to have been drawn from this circumstance, we know of several other complaints where one modification is easily removed, and another proves very obstinate, if not totally incurable. La Fosse, who paid so much attention to the subject of glanders, did not, however, extend his inquiries sufficiently to this complaint; but, on the contrary, contented himself with considering it as a disease existing in the blood vessels, and also in the blood itself, sometimes affecting the red, at others the colourless parts. It has likewise continued, till very lately, to be considered as a disease of the blood vessels; not, indeed, of the arteries, but of the veins, which error was natural enough, seeing the lymphatic vessels, in which course the disease always travels, were considered as a species of veins. The awakened attention of more enlightened minds to the subject, has now shewn, beyond a doubt, that farcy, in its local or early state, is a *specific inflammation of the absorbents of the skin.* As long, likewise, as it remains in this superficial form, it is not very difficult to treat successfully; but when the morbid matter first generated superficially becomes introduced into the system at large, by means of the circulation, it proves very generally fatal; most certainly so, when it ends, as it usually does, in glanders. This spontaneous and general termination in glanders would alone point out its intimate connexion with that disease; in fact, the general identity of the two. Like glanders, also, it may be either generated, or received from without: it is much more frequently generated than glanders. In some instances, where it arises spontaneously, it first appears in the form of diffused swellings over various parts of the body; and, at others, it seems to originate from one immediate sore taking on a *peculiar action*. This peculiar action seems itself to generate the poison, which, becoming absorbed into the system, produces its destructive effects either upon the deeper-seated absorbents, or upon the membrane of the nose, and, finally, on the lungs themselves. No part of the body is exempt from its attack; but the head, neck, and extremities, particularly the hinder ones, are most liable to it. When farcied virus is absorbed by the lymphatics, it occasions a *specific inflammation* in the lymphatic vessel, which it first tumefies and then ulcerates. In other instances, its progress seems to be arrested by a valve, which itself becomes inflamed, hardened, and forms the lump which is popularly called a *farcy bud*. (*See* p. 174.) The slow progress of the disease, in many cases, seems to be dependent on this obstruction offered to the passage of the poison by means of the swellings of the lymphatic glands; and it is by catching the poison at these resting places that we are enabled in the early stages more readily to promote the cure. At length, however, if nothing be done, these tumours or buds ulcerate, and discharge a thin sanies; and from one bud it passes on to another, inflaming the lymphatic vessels as it passes, and giving them a hardened feel like a cord under the skin; and as these vessels run in the course of the veins, so the older farriers were from thence led to their opinion that the farcy was a venous disease, and we find in their writings these enlargements are always described as the "*corded veins*." The invariable course of the affection is towards the thoracic duct, as might be expected, seeing it is, during the early stages, confined to the absorbents, in its passage towards which it inflames and enlarges all the superficial lymphatic glands it meets with: from whence follow not only numerous little farcy buds in the skin, but larger and painful swellings take place in the more considerable absorbent glands of the groin, and of those between the fore legs and maxillæ. Sometimes these proceed to suppurate, when they form extensive sinuses or "*farcy pipes*," which are found, like most poisoned wounds, very difficult of cure.

When the disease originates from contagion, or inoculation rather, for it does not appear to be contagious but when ulcers exist, there is reason to suppose it is most generally effected by means of the application of the matter from a farcied sore of an infected horse, to some inflamed or abraded surface of a healthy one. I am not aware that the introduction of the matter of farcy within the stomach will produce the disease; I am disposed to think the contrary: but the application of the matter to a simple uninflamed mucous membrane will, I believe, without doubt, propagate the farcy, and perhaps likewise the glanders, according to the part it is applied to*.

Farcy is subject to varieties in form and character. It has assumed an epidemic feature, and it often appears compounded with, and modified by, other complaints; but by no means so frequently as the ignorance of farriers would make it, who call every diffused swelling, from whatever cause, "farcied humours." Two distinct varieties of farcy are very common: one of which is entirely superficial, and confined to the lymphatics of the skin, and is called the bred or button

* Mr. Peal smeared the mucous membrane of the nose of an ass with farcied virus, and in eight days it was highly glandered.

farcy; the other commences usually in the extremities, and by far more frequently in the hinder ones. In this kind the capillary lymphatic tubes throughout become inflamed and incapable of their usual office, and hence engorgement of the whole limb takes place, not uniformly, but still universally. This farcied enlargement of a limb is not, to a partial observer, unlike the ligamentary thickening of a gorged leg, neither is it much unlike the swelling from œdema or want of condition. But, independent of the circumstance that this morbid poison will find itself other passages, and proceed upwards, and thus shew itself in its true colours; on a very careful inspection, these swellings, when they arise from farcy, will present an uneven surface; increasing and decreasing suddenly, and attended with pain and tenderness. The lymphatic glands of the skin will here and there point themselves into small buds; and it is further worthy of remark, that such swellings are more likely to exist in definite masses, and *between* the joints than *on* them or *near* them; which is not the case in ligamentary enlargements arising from over-exertion or strain, with which these cases are apt to be confounded, as the more superficial kind is liable sometimes to be taken for those integumental small tumours called surfeit; but which are broader, flatter, and generally more diffused over the trunk than the extremities: and when found on the extremities, they are usually situated on the outer side, whereas the farcied buds are more frequently on the inner side of the limb. A common attendant on the farcy is œdema or dropsy of the limb, dependent on the obstruction offered to the passing of the absorbed lymph. Exercise, by stimulating the anastomosing trunks, will take this away, and this sometimes misleads the observer into a supposition that the case is dependent on a general debility, or want of condition; or arises from cracks, grease, &c. But in these cases it is only a portion of the swelling; that is, it is simply the œdema which is removed; the farcied enlargements will remain the same. Long-continued grease will sometimes degenerate into farcy also, thus shewing that the morbid poison is dependent on some peculiar combinations, which afterwards take on the specific character. A variety of farcy remains to be noticed, which is usually passed over by authors, and which is also one wherein the poison is self generated probably. It often puts on a chronic protracted form, and shews itself by the affected horse becoming suddenly lame in one limb, the tumefaction and heat of which recede and attack the other limb in the same manner. In this way he may remain for months, with his health very slightly affected; at length, however, the disease assumes a more marked character, some of the swellings ulcerate, and glanders eventually closes the scene. Old horses are more frequently the subject of farcy than younger ones, which does not appear to be the case with spontaneous glanders. It is also remarked, that those subjected to it are more liable to a recurrence of it than others. Bad air, filthy stabling, bad provender, and even foul water, appear remote causes of it occasionally, equally with glanders.

The *Treatment of Farcy.*—In the very early stages of this complaint, when it has been taken from another by inoculation, or when it commences in the extremities, it appears then, as we before remarked, to confine itself to the lymphatics of the skin, and in this state it is not found difficult of cure: but when it is generated in the habit, or when received by inoculation of other parts besides the extremities, particularly when it enters by means of the mucous membranes of the head, it is less easily treated with any hopes of success; because, in these instances, the stage between farcy and glanders is so short as to admit of little curative attempt. There is however a pause in some cases between the taking on of the full character of glanders, during which pause a treatment of it judiciously exerted sometimes proves beneficial: but having degenerated into the true glanders, the case becomes nearly hopeless. Nevertheless, I am not prepared to say that it is never cured when it has even tainted the constitution in this way; on the contrary, I think there is reason to suppose that it is sometimes eradicated after this, and insomuch it certainly differs from spontaneous glanders, or that generated by true glanderous matter; but when it has propagated its morbid effects to the lungs, it is no longer curable; nor has it ever been eradicated, I believe, after the nasal membranes became ulcerated. Unless when accompanied with confirmed glanders, many practitioners consider every case of farcy as purely a local affection, and their treatment has been accordant with the idea. But I cannot think it safe under any circumstance completely to trust to such a consideration of it. I formerly thought it might be effectually arrested in the first instance in the absorbents, and that nothing more than the destruction of these was necessary to effect all we wish; nor can it be denied that, sometimes, this has succeeded; but it is more usual in these cases for the disease after some time to reappear, and commonly in a more malignant form. I would therefore recommend to the practitioner always to *treat* it as a constitutional affection, and I then leave it to his own fancy to *call* it what he pleases, either constitutional or local. Whenever it assumes an epidemic or an acute form, bleed, and then proceed with the constitutional treatment to be detailed. Do the same by that tumefied state into which the limbs sometimes fall. In the true chronic form of "bud" or "button" farcy, the cure should be commenced by destroying all the diseased *buds* by caustic or by cautery, and this whether they are ulcerated or not. The quickest mode is to divide them with a sharp firing iron, particularly if they are superficial: if deeper seated, an opening may be made into each with a lancet, and the bud touched effectually with the lapis infernalis (see *Caustics, Materia Medica)*. In more advanced stages, when these tumours or buds are extensive, and have burst, a wash may be made of nitric acid diluted with water, to a state that does not give inconvenient pain, and with this the sores may be washed twice a-day. The internal remedies used are various: nearly all the mineral acids have been found useful, and some of the vegetable ones: it indeed seems principally necessary to the destruction of the farcied virus, that some other poison should be admitted into the constitution of greater activity, though with its acrimony sheathed in some degree: and in such way only can we account for so many of the active agents in the Materia Medica being found useful in farcy. All the different forms of mercury have been tried with considerable success; but the oxymuriate of quicksilver *(corrosive sublimate)* appears to have answered best; and, when determined on, should be given to the full extent the stomach and bowels will bear, without salivation, purging, or symptoms of inflammation being brought on. Ten or fifteen grains may be commenced with, ground very finely, and given night and morning in gruel as a drench, or mixed with butter, lard, or any other substance, as a ball. If this occasion no distress, it may be increased to a scruple, and from this to half a dram, if it be borne with ease: but the utmost care and watchfulness should be exerted when the dose is considerable: for it must be remembered that, with all the mineral acids, they will often exert no deleterious effect until the constitution is supersaturated with them, when they suddenly exert their potency in united baneful effects. When the weakness and irritability of the horse are too great for the exhibition of the corrosive sublimate, give half a dram of calomel twice a-day, or the blue pill, or the sulphuret of mercury may be substituted, still carefully watching the salivating process. Should the stomach suffer much under the use of these active agents, either join with them bitter tonics, or alternate them with each other. Mr. Peal recommends the sulphate of mercury in daily doses of half a dram, united with a dram of gum guaiacum.

After the trial of mercurials, arsenic ought next to claim the attention, as that has proved very efficacious, and may be given in similar quantities, in the same forms, and with equal caution. The subacetate of copper (*verdigris*) was for some time a favourite remedy at the Veterinary College, in doses of a scruple three times a-day, increased to a dram. I have witnessed also good effects from this preparation; but I have found it most efficacious when given in a ball in conjunction with the sulphat of copper (*blue vitriol*), one dram at a dose. Some practitioners chuse to employ all these in conjunction, and they assert the cure is speedier from the combined articles than from any one separately. In this case, give the following:—

Oxymuriate of quicksilver (*corrosive sublimate*) .	eight grains
Oxide of arsenic (*arsenic*)	ditto
Subacetate of copper (*verdigris*)	ditto
Sulphat of copper (*blue vitriol*)	one scruple.

Mix into a ball, and give every morning.

Should the subject be a small, or a weakly one, begin with rather a smaller dose of each of the articles: but in any case, when the quantity is found to sit well on the stomach, increase the dose of each article, daily, one or two grains, carefully watching the effects produced, occasionally resting a day or two; and, however well the ball may seem to agree, do not increase the more active mineral agents beyond fifteen or twenty grains each, without great caution, and the most marked attention to the effects. It has been thought prudent by some to divide the dose, and to give the half, night and morning: but I have not, in general, found any benefit from this plan, for the quantity that the stomach and constitution will bear, will be as well borne at once as at twice; and it may be also remarked, that some horses can take three or four times more than others: and therefore, although great caution be necessary in proceeding with the use of the mineral agents, it is equally necessary that the dose should be increased, in all cases, to as much as the constitution will bear (see *Mercurials and Arsenic in the Materia Medica*). During their exhibition it is also absolutely necessary that the patient should be supported liberally, nor should the stomach and bowels ever be suffered to remain empty for any length of time.

In addition also to the use of the mineral acids, I have experienced much benefit from the following drink, given in conjunction with the ball beforementioned, every day, but not at the same time of the day; the ball in the morning, for instance, and the drink in the evening:—

The expressed juice of the clivers, or goose grass,	six ounces
A very strong decoction of hempseeds	ditto
Essence of spruce	ditto.

Mix.

Green meat should be particularly sought after, and if the bowels will bear it, the horse should be wholly fed on it; but if it gripe, add a quantity of bean meal or split beans to some chaff, and give also. Moist and succulent food appears to do much towards a cure; in one instance, a horse so reduced as not to be able to stand, was drawn into a field of tares and suffered to take his chance: the consequence was, that when he had eaten all within his reach, he was able to rise and search for more, and eventually recovered. When green meat cannot be got, feed on carrots, potatoes boiled, turnips or parsnips; and in the event of none of these being to be obtained, spear the corn, or give malt. It remains to add, that I have received benefit, in two or three instances, from the use of molasses to the amount of four pounds per day: but it has in other instances altogether failed. Sea bathing, with daily doses of sea water, I have also experienced beneficial effects from, in the long protracted cases of farcy, with enlarged limbs and œdema.

DYSENTERY.

Dysenteria.] [Grasfondu.

This disease, the *grasfondu* of the French, and the *molten grease* of our farriers, is, in itself, one of the strongest proofs of the pitiable state in which veterinary medicine has been hitherto plunged. Bartlet, who was educated a surgeon, and should have known better, says, 'by molten grease is meant a fatty or oily discharge with the dung, and arises from a colliquation, or melting down of the fat of a horse's body by violent exercise in very hot weather.' Bracken and Gibson had held the same before him, and later writers on this subject have copied their errors*.

Dysentery appears a peculiar inflammation of the inner or villous

* In a work written on horses so late as 1798, by Mr. John Lawrence, the following absurdity appears:—'Molten grease is a colliquation, or general melting 'of the fat of the body, part of which is absorbed and thrown out on the blood, 'and on the intestines, and voided with the excrements. The horse must be 'much subject to this malady, from his natural propensity to acquire fat in a 'short time.' The author adds, 'I have repeatedly seen that the blood of a 'horse taken up from grass will not only have a greasy pellicle on it, but will cut 'several inches deep in fat: this being of a loose and unsubstantial texture, not 'like the pinguedo or suet, no wonder it will fuse by great heat and exertion.' What this gentleman mistakes for fat in the blood, is only the inflammatory crust or buff; and is simply the coagulum of the blood, and common to every horse, fat or lean, whose vessels are labouring under increased action.

coat of the intestines, producing an increased and morbid secretion of their mucus, and a frequent discharge of it; and it is from the glairy consistence of the discharge that it has been mistaken for the fat of the body melted by heat or exercise, and passed off in this way; and, from so considering it, has arisen the gross term of *mo'ten grease*, by which it is so called in all the former works on farriery: and as, in this disease, there is always present considerable fever, or increased vascular action in general; so when blood was drawn, and it exhibited much buff or coagulable lymph, this also was mistaken for adeps, and was regarded as a further proof, that the fat of the body was at these times in a state of general solution, and floating loose throughout. Some veterinarians deny the existence of dysentery in the horse, because the affection here pourtrayed is not found to be usually either contagious, epidemic, or marked with putridity, as the human dysentery: neither is it generated by marsh miasma; at least, we do not recognise it so here; but there are reasons to suppose in other countries it assumes more of these characters *; and as it has its origin in an inflammatory affection of the mucous membranes of the intestines, which also is the grand characteristic of the human dysenteria, and as, also, both produce a *morbid increase* of the mucous secretion, so I know no better *systematic* name for it than this.

Æquine dysentery differs essentially from diarrhœa, which consists of a simple increase of the peristaltic motion of these organs, and a frequent ejection of the aliments taken, in the form of liquid fæces; while, in dysentery, instead of these, there appears a voiding of a matter actually secreted by the bowels themselves. The secretion is likewise a diseased one; and both serve to form a specific difference between these two complaints. A disposition to form similiar deposits on any inflammatory affection of magnitude in the horse, is remarkable, and has led to a consideration that one and all of these appearances are secondary and not primary.

The *Symptoms* that characterise dysentery as a *primary* affection, are the frequent voiding of this mucus we have described, in stringy portions, not unlike slimy or loose fat, and fœtid, with considerable uneasiness from the tenesmus, and constant inclination to stool. The mucus is mixed in general with the fæces, which are not, except in very aggravated cases, retained, as in human dysentery. Other evacuations occur in which this mucus forms the principal portion; and which serve to distinguish it from diarrhœa, with which it is otherwise very liable to be confounded. If the disease increase in violence, membranous films of coagulable lymph, like sodden leather, are thrown out; and in very aggravated cases, the vessels eject blood instead of lymph; and now and then the intestines become ulcerated. The pulse is variously affected; as, when the inflammation is not intense, it is quickened, corded, and hard, but not thready, as in peritoneal inflammation; but when the case is very intense, or it is about to degenerate

* "Quelquefois aussi elle n'est que le symptôme d'autres maladies plus graves, de fièvres de mauvais charactère, par exemple; son traitement est alors subordonné à celui de maladie principale." "Quelquefois la dyssenterie attaque une grande quantite d'animaux à la fois, soits chevaux, soit bêtes à cornes; elles est enzootique, et reconnaît pour causer les intempéries des saisons ou la mauvaise qualité des fourrages, des herbages ou des eaux."—(*Esquisse de Nosograph Vet. p.* 168.)

into peritoneal inflammation, as it sometimes does, the pulse becomes thready and oppressed. The mouth is always dry, the appetite lost, the flanks heave, and there is usually much thirst: the legs and ears are warm.

Causes.—As we have observed, it has different origins from the human dysentery, being in the horse usually dependent on an inflammatory habit, acted upon by some immediate excitement; and, as such, it is more often observed in the young and robust, from a sudden check to the perspiration, a change of food, cold, fatigue, &c.: acrid substances, as mineral poisons, may occasion it; and, not unfrequently, it is the effect of drastic and improper purgatives. One other cause also remains to be noticed, but which is seldom taken into the account, and that is *metastasis*, or the translation of the matter of fever to the intestines; and which is, I am disposed to believe, a more frequent one than is generally imagined.

Cure.—In the first stage of the complaint bleeding should be premised, to the amount of three to five quarts, according to the size and condition of the subject, and the violence of the inflammatory appearances; and should the pulse continue hard, and the other symptoms indicate it, another moderate bleeding may follow the next day. The yellow buffy surface on the blood drawn must not be mistaken for fat: neither must this appearance alone be a stimulus to repeat the bleedings, as it is in this case observed to accompany the complaint frequently through its whole course. It is also necessary to be aware that sometimes, in spite of the apparent inclination to stool, there exists an absolute and obstinate costiveness, the mucus only passing, but the real dung being retained. This is not frequent; but as it does sometimes occur, so the practitioner should always make himself aware that the dung actually does pass. In cases of true fæcal obstruction, back rake, but with great gentleness, as the intestines, particularly the cæcum and rectum, are, in these instances, extremely irritable and tender. Give a pint of linseed oil, or if the expense be not objected to, half a pint of castor oil. At all events the costiveness must be overcome, and a repetition of laxatives must take place till that event occurs. (See *Laxatives, Mat. Med* *.) But much more generally the fæces pass freely, and in a purging form, mixed with the mucous secretion; and between such evacuations this secretion passes alone, particularly when the complaint is considerable: yet even in these cases, when either cold may be suspected to be the origin of the disease, or the translation of fever to the bowels, or any other cause than superpurgation, the first internal medicine should be the following:—

No. 1.—	Castor oil	eight ounces
	Powdered ipecacuanha	one dram
	Powdered opium	one scruple
	Liquid arrow root	eight ounces.

After this, should the voiding of the fæcal and mucous matter continue, the following may be then given once or twice a-day. And also, when the disease originates from violent purging medicines having been im-

* In two cases I gave calomel and opium liberally, with great benefit; but as I lost the next horse I tried it on, I discontinued the practice.

prudently given, in which cases bleeding, unless the inflammatory symptoms are very high, is not so much called for; then no internal remedies but the following are necessary:—

No. 2.—	Powdered ipecacuanha	two drams
	Powdered opium	half a dram
	Sulphate of magnesia (*Epsom salts*)..	four ounces
	Prepared chalk	two ounces
	Boiled starch or arrow root	a pint.

Mix and give, horning down at frequent intervals starch, arrow root, or linseed tea. It is likewise most essential that one or the other of these demulcents should be thrown up three or four times a-day as clysters: and in desperate cases the belly may be very properly fomented with a hot decoction of poppy heads, and a new sheep skin, if at hand, may be applied afterwards. Or the mustard poultice (see *Mat. Med.*) is by no means an improper application when the inflammation of the bowels appears considerable. Warm clothing is proper, and a moderate temperature; and when convalescence approaches, every care must be taken to prevent a return of the complaint.

Dysentery *in* Cattle.

In oxen and cows this is called *scouring*, *scouring cow*, *braxy*, *bloody ray*, and *slimy flux*. Some of these names, particularly the three latter, are peculiar to this complaint; the two former are common to this and to diarrhœa, or common looseness, with which this is very liable to be confounded: and few of the practitioners among cattle are aware of the real distinctions between the two, and hence the same treatment is pursued for the one as the other. The dysentery is characterised by a peculiar discharge from the bowels, of a frothy slimy nature, with much fœtor or bad smell: sometimes it looks red or brown, and sometimes more yellow, with mucous stringy patches in it; and if observed when voided, it is very hot, and smokes. These appearances of the matter discharged should be particularly attended to, as they will serve readily to characterise the disease, and to distinguish it from simple diarrhœa, in which there is nothing more than a liquid discharge of dung, composed of the mere matters taken in by the stomach in a state of solution. This complaint in cattle is not uncommon to the fat and high fed, and less frequent in winter than in summer: but over-exercise will bring it on at any time; and perspiration suddenly checked may also produce it.

The *Treatment* is nothing different from what is proper in the same complaint in horses: bleeding moderately, fomenting the bowels, or stimulating them with a sheep's skin or mustard poultice. As an internal medicine, No. 1, page 469, should be given first, and will be found to have a particular good effect on the bowels. This may be followed by No. 2 in this page; and in all other respects treat as there directed. In cases where the above remedies might be considered as too expensive, begin with six ounces of Epsom salts, and one scruple of powdered opium: after which give once or twice a-day a pint of thick starch, in which has been mixed an ounce of prepared chalk.

Sheep are also troubled with a dysenteric affection called *braxy*, in which there is a frequent stooling of soft dung mixed with blood and mucus. When it terminates fatally, these motions become dark and fœtid. If the inner surface of the eye be very red, and the animal strong, take eight ounces of blood away. Give two or three ounces of castor oil, with thirty drops of laudanum; or an ounce of salts with the same quantity of opiate: after which give, night and morning, the following:—

Powdered ipecacuanha	fifteen grains
Prepared chalk	one dram
Powdered opium	two grains
Boiled starch	four ounces.

House the animal, give gruel or starch in case the cud is lost, and the cure will be complete.

CLASS IV.

DISEASES OF THE BRAIN AND NERVES.

EPILEPSY.

THE *Meagrims, Sturdy,* or *Turnsick,* may be considered as a species of *Epilepsy,* to which horses are not unfrequently subject; and in which, without previous notice, the animal if in exercise stops short, shakes the head, looks irresolute and wandering; in which state he continues a few minutes, and then proceeds as before. In more violent cases he falls at once to the ground, or first runs round, and then sinks senseless. The whole system appears agitated by strong convulsion, the horse dungs and stales insensibly, is at sometimes violent, and at others more passive, but is equally unconscious to every thing around in both. After remaining a longer or shorter period in this way, his faculties return, and he rises. It appears dependent on some spasmodic affection of the brain; and in some cases is the effect of the mechanical pressure of the blood on it, brought on by a straight collar, too tight reining, &c. &c. In others it is occasioned by the morbid pressure of blood thrown on the head by constitutional causes. Such is found in the full, plethoric, over-fed horse; particularly when subjected to long confinement. It may be distinguished from gripes by the suddenness of the attack, and by the horse being insensible to surrounding objects, which is never the case in colic.

A *Cure* may, in general instances, be effected by a course of mercurial alteratives, followed by, or alternated with, purging medicines: after which, turning to grass for three months greatly ensures success, by destroying the habit of the disease. If it be suspected to be dependent on plethora, bleed, and feed less liberally, and proportion the exercise to the work.

PARALYSIS.

Palsy of the whole muscular frame is very unusual in the horse, except some actual pressure be made on the sensorium; but paralysis of the extremities, particularly of the hinder ones, is not unfrequent. It is however less frequently the effect of a morbid attack on the brain and nerves, than brought on by accidental injury, as from casting, blows, turning short in a narrow stall, &c. &c. If it be ascertained that a fracture exists in any part of the spinal column, the integuments must be raised, and the depressed portions of bone removed. If the injury be less severe, it is possible that extravasated blood only, or serous deposit, or coagulable lymph, disturb the functions of the part; in which case, topical applications are requisite, first to allay the increased action excited by the injury, and then to encourage an absorption of the obstructing deposit.

SPASM.

The muscular fibre is liable to have its irritability morbidly excited by an action of the nervous system, either undue in quantity or quality; producing various affections known under the general name of spasm, but subdivided according to the part affected with this excitement. When universal, it forms tetanus: when confined to the bowels, it forms gripes; and when it attacks the neck of the bladder, obstruction to the urine follows. Inflammation of the sensorium, or of the nerves, or of the investing membranes of these organs, can produce this excitement. Thus in phrenitis the horse is excited to exertions much beyond his usual powers. In rabies, this is particularly seen. Irritation occasioned by foreign substances can also produce it, perhaps by exciting an immediate inflammation; although the instantaneous spasm which follows mechanical pressure and irritation, both in the sensorium and the nerves, can hardly be accounted for thus. Antispasmodics act either by allaying the nervous excitement, or by rendering the part attacked above or below the disposition to be excited. In the first instance opium, belladonna, tobacco, and other narcotics are employed. In very violent cases of spasmodic affection, copious bleedings, combined with very considerable doses of opium, are powerful antispasmodics. In the obstructed spasmodic state of the bladder, nauseating remedies are the best antispasmodics. Those remedies which act by altering the susceptibility of the part, are bleeding, purging, and other evacuants; which do it by diminishing the excess of power, and are therefore proper in plethoric subjects, or when the spasm is united with great vascular action. When, on the contrary, the spasmodic affection attacks a debile part, we use stimulants to bring the part to a state to resist the impressions.—See *Antispasmodics* and *Tonics*, *Mat. Med.*

TETANUS.

Tetanus.] [Mal de Cerf.

This dreadful spasmodic affection, known to the older farriers by the terms stag evil, or locked jaw, may be considered as an attack on the sensorium itself, as is evinced by a full examination of its symptoms, which exactly correspond with those produced by other excitements, both mechanical and morbid, on the cerebral mass. Such a consideration of it agrees also with its morbid anatomy. Originating in the brain, it appears to extend itself along the medulla oblongata to the spinal marrow, on which it produces appearances which characterise its march. The irritation is afterwards extended along the nervous trunks in the order of their recession from the head, exciting into morbid and convulsive action all the voluntary muscles of the body; and, at last, affecting also those whose motions are mixed. It is not, however, alway thus extensive; it sometimes is somewhat local, and stops short of the trunk, affecting only the head and neck; but more frequently it extends along the whole spinal column and the extremities, involving the whole external frame into one rigid statue-like form.

Tetanus in the horse is both idiopathic and symptomatic, or traumatic; but, contrary to the human, the idiopathic is much the most frequent. Idiopathic tetanus is brought on by irritating agencies unknown to us. Sometimes bowel affections may occasion it, and in this way worms appear to produce it *; but the most common cause appears that of cold. It has long been observed in hot climates, where the disease is very prevalent in the human subject, that cold supervening on a heated frame, was a usual cause of it. As far as my observations go, the same causes operate in an equal degree in the horse, in which it is peculiarly brought on when the heat and the cold are irregularly applied. Thus I traced two instances, in my own practice, to water making its way through the ceiling, one by rain through the tiling; the other by the bursting or leaking of a tank upon the flanks of horses in otherwise warm stables. I also have observed the effect of cold at grass to be the same, for a horse became tetanic who was known to have sheltered himself under the lee of a warm hayrick, unmindful of the dripping which deluged his back from the eaves; and which certainly proved his destruction; for he would, had it not been for this circumstance of the eaves, have been sheltered from the descending torrent. I have also known it produced by the carelessness of a servant leaving a horse, in a state of full perspiration, exposed two hours at an inn door, while he regaled himself within. Symptomatic tetanus, called also traumatic, as being connected with wounds, is the consequence of some local injury, commonly of a lesion of parts †, and often of the most trifling kind, as treads, corns, lacerations, punctures in the feet, &c. It is considered as most apt to follow wounds of tendinous and ligamentous parts; but my experience has not justified this preference. It follows docking and nicking frequently.

Traumatic tetanus has been attributed to the partial division of the nerves of the wounded portion, and hence a new and deeper division of the part has been often practised; but the benefit derived has not been such as to justify the supposition, although the practice is still

* Gibson, who appears to have seen many cases of the disease, attributes it frequently to worms. Mr. Wilkinson also describes a case, evidently originating from the erosion of bots on the villous portion of the stomach.

† Determinate lesion of parts is not, however, necessary to its generation. I have more than once seen it brought on by bruises. Within these few days, a valuable horse slipped upon the pavement and fell, by which the shoulder was evidently bruised, without, however, any laceration of integuments. On the third day after the accident, which appeared very trifling, I was sent for, and found the poor animal universally tetanic; and so violent was the affection, that, in spite of every means used, he died on the third day from the attack.

pursued on other principles. It is a peculiar feature in the case, that the tetanic symptoms often appear not only many days, but even weeks, after the wound has been made, and very frequently after it has altogether closed. When the attack commences under the existence of an open wound, such wound has sometimes, for some days before, exhibited an unhealthy aspect.

Dissections of tetanic cases exhibit some increased vascularity of the brain, and its meninges; in some instances these appearances are considerable: the medulla spinalis usually presents similar features. It has been seen darker in colour, and I have myself found it less tenacious than natural; but its vaginal coats are usually more inflamed than the cord itself, and there is usually a serous deposit interposed between them. The thoracic and abdominal viscera also usually present marks, which, *à priori*, one should not be led to expect. I have seen the lungs and stomach both highly inflamed; and a slaughterer of horses told me that he seldom, if ever, cut up a horse which had died of stag evil, without finding inflamed lungs*. The intestines also usually present inflammatory marks about them; and, as might be expected, the veins throughout the body, particularly the superficial set, turgid with blood.

The *Symptoms* of this painful malady are sufficiently marked to make it ever remembered by any one who had once seen it. It commences usually by a certain stiffness about the throat, and difficulty in swallowing, or in turning the head, which soon extends itself to the jaws, and occasions a painful contracted state of the mouth, with the usual inclination to masticate, but it is very imperfectly performed. As this increases, the jaws can hardly be separated at all, when farriers say the horse is "jaw set." By the tetanic action of the retractor muscle, the haw is drawn partly over the eye, at the same time that the tension of the other ocular muscles gives the eyes a vivid appearance and retroverted aspect, which ill accords with the more placid effect of a protruded haw. As the disease extends over the voluntary muscles of the trunk and extremities, the appearances are distressing in the extreme. The head is raised, the ears pointed forwards, and the nose is carried out. The legs straddle wide, the tail is cocked, and quivers with the constant fatigue of the levator muscles; and the abdominal muscles are drawn tight over the belly, giving to the horse an appearance of having just completed some extraordinary exertion. The complaint presents a few moments of relaxation sometimes, from the extreme and powerful contractions of over-strained muscles. When this is not present, profuse sweats mark the distress and exertions of convulsion. The circulation is, in most instances, at first not much affected, but, as the disease increases, the pulse quickens and becomes tremulous and irregular. The respiration, at first little affected also, now is somewhat increased, in which state the animal remains a longer or shorter period, when the constitutional strength either overcomes the spasm, or the system yields to its violence.

Costiveness is usually present, the urine is sparingly made; the appetite often continues undiminished, or, I am apt to suspect, that an

* Mr. Percevall mentions two fatal cases of tetanus, in which the cuticular coat of the stomach was extensively eroded, and the internal coat injured.

attack on the stomach frequently occasions a morbid inclination for food, without the ability to eat.

Prognosis.—This is always unfavourable, from an observation that the unsuccessful cases so greatly exceed the number of successful ones. In the human subject, the idiopathic kind has been found much the most manageable: but I have not observed much difference in this respect in the horse. It generally wears the animal down, by the excessive irritation, sooner or later; sometimes in three, four, or five days, and it has been protracted to three weeks: its fatal tendency also must of course be greatly increased by the extreme difficulty usually experienced in giving nutriment. But when the jaw is not wholly closed, and an inch or two of space remains, some hope may be entertained.

Treatment.—Although the greater number of instances prove fatal, yet still a sufficient number recover to warrant our utmost endeavours; and the more so, as most of those who do survive appear to do so from the beneficial effect of the treatment adopted. The very different means which have been successfully employed, might stagger the sceptic, and make him attribute the recoveries under these discordant medical agencies to constitutional strength: but there is no reason whatever for such a conclusion. This is not the only instance by many, wherein very opposite means are beneficially employed for the cure of the same disease in different subjects. Every practitioner is aware of the benefit derived from cold applications in some inflammatory cases; and every one is equally aware how salutary hot fomentations prove, apparently, in similar inflammations, in other subjects. A curative end is equally produced by both: the *modus operandi* to us is not evident. This circumstance should make the veterinary practitioner not absolutely wed himself to one plan of treatment universally. When any such has been pursued without appearance of success, let another be adopted. In the early years of my practice, I trusted principally to the sedative effects of cold to these cases; and perhaps, although such effects may not continue permanent, yet no instance occurs where the rigidity of the muscles will not give way, for a time at least, to an extensive application of ice. Under these impressions, in the former editions, the directions to the practitioner for the treatment are as follow: As soon as called in, let the horse be immediately moved from the stable into the open air, and there let him be dashed with the coldest water for twenty minutes; after which he should be only partially dried, and by no means again moved into the stable, but suffered to remain, if in summer, in the open air; if in winter, he may be placed in a loose open stable, but made as cool as possible. After this first bath, proceed to blister the whole spine, beginning at the back of the head, and the sides of the neck, in the course of the cervical vertebræ which dip down deep within the substance, but at the withers recommence the blister on the margin, and rub it in most actively along the spine to the root of the tail, and, when finished, cover the whole over with some adhesive matter or covering, so that the future ablutions may not affect the rising of the blister; or what is better, repeat the blister every day. Having done this, proceed to examine the state of the bowels, which, if constipated, remove by the means detailed under the heads Purgation and Laxatives; after which give the following:—

No. 1.—Powdered opium	two drams
Camphor	two drams
Carbonated ammonia (*spirit of hartshorn*)	one ounce
Spirit of turpentine	two ounces
Strong ale	a pint.

Mix, and repeat every two, or at least every three hours, by the mouth if possible; but should the jaws be so closed as to render this impracticable, let it be done by the *nose*, which may be effected by good management; only that in this case it will be prudent to dilute the drink still further with more ale or gruel, to lessen the irritation to the nose: having done which, fill a quart bottle with a long smooth neck, and elevating the head rather beyond a level, so that the liquor may have a slight inclination towards the throat, introduce the neck of the bottle up the nostril, and gradually pour down the liquid. With a little dexterity, medicine and nutriment may be thus given through the whole disease. When all these directions have been followed, throw up the following clyster:—

No. 2.—Boil twenty poppy heads in six quarts of water to a gallon, add Camphor dissolved in spirit, one ounce.

It is necessary to remark, that the spasm will not only prevent the tail being conveniently held over the anus, but the intestinal rigor will eject the contents from the rectum, unless most carefully retained by a wisp of hay or cloth kept fast by the pressure of the hand. By pressing down the tail, if not too rigid, retain this as long as possible; and when there is a necessity of nourishing the horse by the intestines, as there will be after the first day, boil the above in less water, and add gruel, broth, or tripe liquor.

In three or four hours repeat the cold affusion *, the drink, and the clyster; and continue to do the same at regular intervals, if any benefit appear to arise from the treatment. And when the tetanic affection has resulted from an external injury, it will be also prudent to examine into the state of that. If docking have preceded it, take off a fresh portion of the tail, as there is reason to suppose that beneficial results follow a division of the communication between the part and the brain. (See *Neurology; see also Neurotomy.*) If nicking have brought it on, widen, deepen, or even make new sections. If it have arisen from a punctured wound, do not hesitate, if the wound be closed, again to open it, and proceed actively to stimulate it. And as the afflicted animal appears to suffer by a peculiar irritation more than by obstructed functions; so it is particularly necessary to support the strength, and thereby endeavour to wear out the disease. Nutriment

* When the last edition of this work was preparing for the press, I had then occasion to mention the striking advantages derived from cold affusion, in a particular case in the practice of Mr. Youatt, where complete success appeared certain, had it not been frustrated by the ignorance and obstinacy of the owner, who perversely forbade the repetition of the treatment, when all the symptoms had greatly relaxed their violence. As might be expected, the horse again became rigid, and died. Mr. Morecroft considered cold as the only remedy for tetanus; and in a case which fell under the notice of Mr. Blanchard, V. S. 3d Dragoons, a tetanic horse was turned into an open yard during a cold and tempestuous night, and was found in the morning well. Other facts might also be brought forward which fully prove that, in some cases, the sedative effects of cold form the best means of counteracting the tetanic convulsion.

should, therefore, be most actively introduced into the system both by the stomach and bowels. Veterinarians are apt to be misled on the subject of nutriment by clyster. In this way horses may be supported for three weeks; and as long ago as Gibson's time, we find that this matter had not escaped his attention, and his strong recommendation of it shewed in what light he held it. (See *Clysters.)*

In addition to this plan, I would now recommend that, in strong plethoric horses, one very full bleeding be premised. I have also seen benefit derived from enormous repeated bleedings, intervened by very large doses of opium, but in other cases this plan evidently hastened the fatal termination. A buffy coat in the blood is here no indication of its being proper to repeat the bleeding, as in violent cases of increased action this appearance is dependent on a particular state of the arterial trunks, and continues with them, even when more blood is abstracted than can be replaced. It remains for me to say, that I have now not the same prejudice in favour of cold affusion as formerly. I might in my own practice, perhaps, commence by it; but unless an immediate and considerable alteration were evident, I should not adhere to it, but shift my ground, and try the effects of a warm temperature and external stimulants, which plan appears to have proved salutary in many instances, in the practice of numerous veterinarians. Mr. Wilkinson, of Newcastle, details many successful cases thus treated in his practice. He keeps up a continual warmth over the external surface of the body, by sheep skins, first stimulating the skin by rubefacients. Mr. Feron has found a bath heated to 90°, in which the horse was kept for three hours, produce evident mitigation of symptoms. Mr. White reports favourably of opium, in large and often repeated doses. Pressure on the brain has been tried, and seemed to give some relaxation to the contraction. In France, bleeding, warm bathing, setons, with large doses of opium by the mouth and clysterwise, form the mode of treatment. At Berlin, Mr. Sewell saw an electrical apparatus, said to be used on tetanic patients. I have seen the whole list of narcotics tried without benefit.

SPASMODIC COLIC.—See Class V.

STRINGHALT.

By some unaccountable omission, this peculiar affection was passed by unnoticed in the last edition of this work. I wish it were in my power to do more than simply to give its name and place in this. Mr. Feron defines it to be "an involuntary convulsive motion of the muscles, which extend or bend the hock." He also informs us that, in France, Spain, and Germany, it is esteemed graceful in the riding-houses, when in both hind legs. Mr. Percevall derives its origin from an affection of the spinal marrow, which opinion he was led to adopt from "having observed a broken-backed horse exhibit all the characteristic signs of stringhalt." In this exposition, I cannot agree with Mr. P.; but when he adds, to an affection of the spinal marrow, or of "the nervous trunks passing between it and the affected muscles," I fully agree with him, and have ever viewed it in this light. Were the medulla spinalis affected, we should have it in both limbs, whereas it is not unfrequent to find it confined to one. It is not unlikely that some nervous twig, in its passage, meets with continued irritation, probably from mechanical obstruction over an exostosis or ligamentous enlargement; or from some pressure, as nipped between two tendons or capsular ligaments, &c. &c. In whatever way, however, it be brought about, we regret that, in common with others, we have nothing to offer as to its cure.

CLASS V.

DISEASES OF THE ALIMENTARY CANAL.

SPASMODIC COLIC.

Cholica.] [Tranchées.

THE spasmodic or flatulent colic is the disease known to farriers by the terms *gripes*, *cramp*, *fret*, and *gullion*. Although called flatulent colic, flatus is not so characteristic or predominant a symptom in it, as in the same disease in the human. We have already described the intestines as muscular organs, and we have stated that such structure is peculiarly liable to spasm; consequently we are not to wonder that the alimentary track of the horse should be liable to it. In the human, the stomach is also sometimes the seat of spasm, but in the horse I have never known it to happen. Spasmodic colic appears more apt to affect the small intestines than the large; but instances are sufficiently common when the large intestines also become affected; and when the spasm extends to the posterior part of the cœcum and rectum also, the bladder sometimes participates in the convulsion, and frequent ejections of urine occur. In other instances, the neck of the bladder is the principal sufferer, and suppression of urine then marks the occurrence. That colic is dependent on a spasm of the muscular structure of the intestines, we have proofs from the appearances which present themselves after death, in fatal cases; when these organs will usually be found puckered, and drawn together, or some portions will afford marks of violent contraction as though tied round with a cord. Occasionally we find intussusception, or one portion of intestine invaginated within another; in which instances, inflammation is usually brought on by it. Spasmodic colic, however, usually exists without inflammation; but it occasionally terminates in it, either from the irritation of long continuance; or from that irritation brought on by violence, as beating or rubbing the belly immoderately hard with a stick, &c. Inordinate exercise, as violent galloping some miles, may do the same, and, perhaps, though more questionable causes are found in stimulants of extraordinary potency or irritant quality, powerful purgatives to overcome the costiveness usually present, I have remarked, have this tendency; and a still more frequent cause is the invagination of one portion of intestine within another. As the proper medical treatment of spasm of the bowels, and of that which inflammation of them indicates, are essentially different; so it is of considerable importance to be at once able to decide which of these affections is present: and which decision is by no means difficult by moderate attention to the distinguishing features of each, as already detailed in enteritis, and now to be described in colic.

The *Symptoms* of spasmodic colic are usually sudden in their appearance, and not marked, as in inflammation of the bowels, by previous indisposition; but the horse is observed to be at once attacked with considerable uneasiness, shifting his position from side to side, pawing his litter, and stamping with his feet impatiently. After a few minutes thus passed, the pain remits, and leaves the horse tolerably easy; while in enteritis no perfect remission occurs, but all is one scene of nearly equable pain and distress. As the colic advances, the remissions are less perfect, and less frequent: the horse now lies down frequently, and on rising shakes himself, looking round to his sides, which occasionally, in desperate cases, he snaps at with his teeth; but more frequently he is seen to strike with his hind feet at his belly, as though determined to remove by force the cause of his pain. In enteritis this acuteness of sensation or violence of temper is seldom seen. When on the ground, it is not uncommon for the horse to roll on his back; sometimes he will remain in this situation a few seconds, or he will roll over; neither of which are usually done in simple inflammation. In colic the pulse is seldom much altered from its natural state, unless the colic have existed some time, when it sometimes presents marks of general irritation, and is not only quickened, but also somewhat hardened. If felt also during the intensity of the paroxysms, it will likewise be often found to be disturbed even in the early stage, but this is momentary only, and ceases on the remission of the pain. If, therefore, the junior practitioner should chuse this period for forming his criteria of the disease, he may be misled; for under the immediate influence of the existing spasm, it will in some instances present a full bounding accelerated stroke, but more often a wiry thready though quickened beat, both which may, therefore, be mistaken for inflammation. The extremities in colic are not often much affected, and they never remain intensely cold for a considerable period, as in enteritis; but the coat stares, and the horse breaks out frequently into cold sweats. Sometimes he is seen to attempt to stale without effect, at others he stales frequently; but in most instances he is costive, or a few hard, dry balls are forced away by the spasmodic efforts, in which cases his belly is hardened, and drum-like to the feel.

Causes.—These are various, but the most frequent is cold supervening on heat, either through the medium of application to the skin, or by application at once to the bowels in the form of cold water taken when the horse is very warm. Costiveness will also sometimes occasion it, and improper food is likewise not an unfrequent cause, by which chemical combinations within the bowels disengage deleterious gasses, but which appear rather hurtful in quality than quantity; for as before observed, although the belly may become hard, there is usually not a very great flatus present in æquine colic.

In some horses gripes occur so frequently, under every variation of situation, food, and habits, as to give reason to suppose either peculiarity of conformation, hereditary tendency, or the presence of calculi in the intestines; which latter become more frequently the origin of oft repeated colic than is imagined*.

Cure.—When the spasms are violent, or when they have continued without mitigation some hours, bleed, and according to the intensity or duration, do it more or less liberally. Extensive bleeding, it should be remembered, is one of the most powerful relaxers of spasm with which we are acquainted, and instead of its being an antagonist to the antispasmodic treatment usually adopted by internal remedies, it is found to be infinitely increased in efficacy when conjoined with large doses of opium. Since the former edition of this work, I have had so many opportunities of witnessing the effect of this combination, that I cannot too strongly recommend it†: and although most of the ordinary cases of spasmodic colic will yield to the common stimulant treatment, and many would go off without any treatment at all; yet bleeding is always a safe and a prudent precaution in every case, as a preventive to inflammation; and in the more aggravated cases it is essentially necessary both to combat the inflammatory tendency, and to promote the relaxation of the spasmodic irritation on the muscular fibre. It is likewise particularly indicated in these violent or protracted cases, to counteract the irritative qualities of the antispasmodics used, which though in other instances of simple spasm are innocuous, however large, yet may not prove so when an inflammatory tendency is at all suspected to be at hand, or already begun. In every such instance, bleed liberally, and which in any case, when the horse is in moderate condition, cannot be hurtful; but the practice of bleeding in the mouth is perfectly useless; and though with Mr. Peal I would most strongly condemn violent and particularly long continued exercise, yet I have so frequently experienced the good effects of a brisk trot for ten minutes, that I cannot but recommend its adoption; but galloping, or a longer continuance of exercise I strongly condemn. Brisk friction to the belly is also to be employed, by means of a brush, or if with a heated coarse woollen cloth it will be better; but the practice of rubbing with a stick, I apprehend, is rather disposed to bruise the belly than to benefit it by friction. Fomentations of very hot water are also sometimes singularly efficacious. As internal remedies, either of the fol-

* Mr. Clark attributes gripes in some instances to the natural "shortness of the omentum, and its thinness of adeps, whereby the guts, particularly the cœcum and colon, are not kept so warm as in animals in which it is of greater length." Surely such a cause is rather unphilosophical as well as unphysiological likewise. Nature is not found to subject her children to disease from general peculiarity of structure, without sufficient counteracting means to obviate the effects of such deviations from her usual course; of which care we have innumerable instances.

† As the practice of uniting bleeding with the usual antispasmodics is common in the general cases of gripes with many of our best practitioners; and the relaxant qualities of this combination in spasms is a pathological fact well established; it occasioned me some surprise to find Mr. Percevall on this subject saying that "the practice cannot be justified so long as stimulants and opium are deemed requisite." It is to every observant practitioner familiar, that under spasm, stimulants seldom if ever hurry the circulation into inflammatory diathesis. Nay, even the sensitive stomach loses its wonted irritability in the general excitement of the muscular fibre; and doses of active stimuli, which in other instances would destroy, may in these cases be repeated hour after hour without the smallest danger, or even increase of the circulation.

lowing may be administered with some confidence, as speedily after the attack as possible:—

No. 1.—	Ground pepper	half an ounce
	Spirit of turpentine	two ounces
	Tincture of opium	one ounce
	Sound ale	four ounces.

Mix.

No. 2.—	Spirit of vitriolic æther	one ounce
	Tincture of opium (*laudanum*) .	two ounces
	Oil of peppermint	one dram
	Common gin, and	
	Sound ale, of each	a quarter of a pint.

No. 3.—	Spirit of turpentine	two ounces
	Oil of peppermint	one dram
	Castor oil, and	
	Watery tincture of aloes, each	six ounces.

The latter is more particularly proper when costiveness is present, and when it continues unrelieved after back raking and clysters have been given, which in every instance of violent colic should be done: neither can relief be at all expected in cases accompanied with obstinate constipation, except the alimentary passage be somewhat opened. As a domestic remedy, and one which has relieved at the moment, when other medicaments were not at hand, I would recommend the following:

* Ground pepper	a tea spoonful
† The juice of two or three large onions	
Common gin, and	
Sound ale, of each	a quarter of a pint.

In every case, if relief be not obtained in an hour, repeat all the particulars of the treatment.

Colic *in* Horned Cattle.

Oxen and cows are subject to this complaint, but which does not differ in symptoms or treatment from that of horses. There is likewise, at times, a species of colic observed among cattle, arising from *costiveness;* in which cases the hardened fæces accumulate, and the liquid parts make their way through them, or by their side. This is called, among drovers and persons about cattle, *fardal-bound,* and is very dangerous, from the deceitful appearance it puts on being frequently mistaken for purging. It is evident this can only be cured by brisk purgatives; and if the obstructing mass be within the reach of the arm, back-raking should be resorted to. Bleed, also, to prevent inflammation.

* Mr. Bracy Clark has such a dependence on the pimento or pepper, that he has written an express treatise on its virtues, as a remedy in gripes. His formula is a pound of the pepper ground fine and steeped in spirits of wine, and of water, each three pints. Of this tincture a quarter of a pint is a dose, to be repeated every hour until relief be obtained. The use of pepper has long been in vogue among farriers and graziers; and although it is certainly in many instances efficacious, yet it does not possess any qualities over other spicy stimulants, to warrant our considering it as a specific remedy, nor our dependence on it to the exclusion of more active antispasmodics.

† La Fosse strongly recommends a curious remedy for colic, not unknown also to the older English farriers, and which consists in pounding an onion, and mixing with it savin and pepper, which mixture is to be introduced high up the rectum, after which the horse is to be moved briskly about.

CHRONIC INDIGESTION.

Dyspepsia.]

Horses are subject to a loss of appetite, from some morbid change in the stomach, or some disease in its secretions. We have had many occasions to advert to the sympathy existing between various parts, and the present is a prominent instance of the same; for in every case of dyspepsia the skin is found to sympathise with the stomach; and this affection is therefore always accompanied with dry staring hair, and that inelasticity of cuticle termed *hide-bound*. The horse continues to eat without appetite, or with one irregular in its desires; and what is taken in, is frequently passed away nearly in the state in which it was eaten.

Causes.—In spring and autumn, at which times the sympathy between the skin and stomach produces the phenomena so usually observed of faintness, perspiration, and irregular appetite. It is sometimes occasioned by worms. Improper food, as musty hay or corn, unventilated or over heated stables, too great a quantity of clothing, the injudicious use of spicy stimulants, as cordials, are all, however, more frequent causes of it.

Cure.—Its removal must, in a great measure, depend on becoming acquainted with its cause. In spring and autumn feed more liberally, and encourage a determination to the skin; by which means the secretion of the new hair will be accelerated. In cases of improper feeding, either as to quality or quantity, alter these sources of it; and it should be remembered, that too much food is likewise a fruitful source of dyspepsia, by calling forth powers not proportioned to the wants of the constitution. When originating from worms, treat as under that head. If it should appear to arise from want of tone in the stomach itself, aloes, in combination with the warm bitters, will produce a determination of blood to the digestive organ. The proper remedies for these cases are detailed, and the treatment enlarged upon, under the articles *Stomachics* in the *Materia Medica*, and also under the article *Condition*, page 62.

ACUTE INDIGESTION.

Horses distend their stomach by immoderate quantities of food, less frequently than horned cattle; but when such a circumstance occurs, it proves much more fatal in the former than the latter: it is also characterised by somewhat different appearances, which from their resemblance to staggers have gained it the name of *stomach staggers*. But from what has appeared on the subject of the specific inflammation of this organ, it may be seen that many of the cases attributed to *mechanical distention* are dependent on other causes. In treating of digestion, we explained the reasons which Nature seemed to have in view in giving the horse so small a stomach; and which formation of necessity hastens the expulsion of the aliments through it: from which circumstances it is possible, that, without a previous debility in the organs, occasioned by inanition, no quantity of proper food taken in will distend the stomach of the horse beyond its power of contraction. In horned cattle it is different; both their habits and structure are such as to render them more liable to this complaint; for, without any previous fasting, they, by eating inordinately of succulent vegetables, may produce it; for as there is a necessity for them to regurgitate and remasticate, so the food they first take in is not passed onwards, but accumulates; add to which, that as it is to undergo a second mastication, so they take it in more quickly. It might be expected that acute indigestion, or hoven, should be attended with more acute symptoms in horses than in kine; for in the latter it is only the recipient stomach, or paunch, that suffers distention, and which is less vascular and sensible than the digestive stomach, which is the suffering organ in the horse. Therefore, when this disease proves fatal to cattle, it is by rupture or by suffocation; but in horses the simple irritation will kill, by its effects on the sensorium. When long fasting has debilitated the stomach, and perhaps vitiated the gastric fluid; if food, particularly dry food, be presented to a horse in large quantities, he will be apt to eat voraciously, and will hardly allow himself time for due mastication, by which little saliva becomes mixed with the mass, and thus the food passes into the stomach more than usually undiluted, where it probably meets with a weakened or lessened quantity of gastric fluid, by which the evil is aggravated.

Symptoms.—A horse with *acute indigestion* gradually expresses uneasiness, leaves off eating, holds out his head, looks at his sides, stamps with his feet, and has cold sweats; which symptoms increase till at length he becomes delirious or comatose. This arises simply from the distention of the stomach, which occasions a sympathetic effect on the brain, the appearances of which so nearly resemble staggers, as to be with difficulty distinguished from it but by the quickness of its progress; and in this state it usually continues till the animal dies, which is seldom more than a few hours from the attack. An ingenious farrier in Sussex informed me, he had met with two cases lately of acute indigestion from eating grains: in one, the stomach burst; in the other, the horse threw up a vast quantity, and recovered.

Treatment.—The affection, in most cases, proves fatal. We cannot puncture the stomach in the horse as in cattle, nor will the introduction of any instrument relieve the distention, seeing it is more massive than gaseous. The only hope we can, therefore, indulge is, that by stimulating the stomach, perhaps a better secretion may be obtained, and the contractile powers, in some measure, restored by the stimulus. Ardent spirits may be given in large quantities, as half a pint of brandy, or more; gin, rum, &c., or the following:—

Spirit of hartshorn *(carbonated ammonia)* .	two ounces
Oil of turpentine	four ounces
Linseed oil	half a pint.

Mix, and give every two hours.

Purgatives are too slow in their effects to be beneficial: bleeding may be tried, but it can do little good; for though it may unload the vessels of the head and of the brain, yet these are but *symptomatic*, and it may add to the weakness of the stomach, which is *primary;* but raking should by all means be made use of, and a clyster of gin and strong peppermint water may be thrown up.

A species of acute indigestion is also sometimes observed, particularly in the spring, in both horses and horned cattle, called by the French "*mal de brout,*" or "*maladie de bois,*" and is supposed to be occasioned by eating inordinately of the young shoots of particular woods, gathered from the hedges, &c. The symptoms betoken rather inflammation of the stomach and bowels, from the deleterious nature of the matter taken in, than from the effects of distention. The pulse is found contracted, the skin hot, thirst great, bowels constipated; and such fæces as do pass, are hard and covered with glair, and often streaked with blood. The mucous membranes of the eyes, nose, and mouth, are inflamed; and as the disease advances, they throw off a fœtid, sanious secretion.

Treatment.—If it be early discovered, bleed liberally; but later in the complaint, the bleedings should be small, or entirely omitted. Attempt to open the bowels by neutral salts, united with the watery tincture of aloes (see *Mat. Med.*), or by the tiglium. (See *ditto.*) After which, give, every two hours, six ounces of acetated liquor of ammonia (Mindererus's spirit, *Mat. Med*). Back rake, and clyster largely.

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Acute Indigestion *in* Cattle, *called the* Hove, *or* Blown,

Is a more frequent complaint, but is more easily treated, and less fatal; nevertheless it has been the death of thousands, and is sufficiently terrible in its effects to render all our exertions necessary; and, from the frequency with which it occurs, it has become a subject of investigation with almost every rational grazier, and a particular matter of inquiry with every agricultural body; from whence it is now very successfully treated by the usual attendants on cattle when skilful; but when otherwise, it usually proves fatal. It is observed to be more frequent in warm weather, and when the grass is wet. When either oxen, cows, or sheep, meet with any food they are particularly fond of, or of which they have been long deprived, as potatoes, turnips, the different grasses, particularly red clover; they eat greedily, and forget to lie down to ruminate, by which means the first stomach, or paunch, becomes so distended as to be incapable of expelling its contents. From this, fermentation begins to take place, and a large quantity of air is let loose, which still adds to the distention, till the stomach either bursts, or, by its pressure on the diaphragm, the animal becomes suffocated.

The *Symptoms* are sufficiently known by the uneasiness and distress, and the general swelling of the abdomen; with the circumstances of the beast being found with such food before him, or the presumption that he has met with it.

Treatment.—There are three modes of relieving the complaint, which may be either of them used according to the degree of distention, and length of time it has existed. These are *internal medicines;* the introduction of a *probang* of some kind into the *paunch* by the throat; and the *puncturing* it by the sides. Dr. Whyatt, of Edinburgh, is said to have cured eighteen out of twenty hoved cows, by giving a pint of *gin* to each. *Oil,* by condensing the air, has been successfully tried. Any other substance also, that has a strong power of absorbing air, may be advantageously given. Common *salt* and water, made strongly saline, is a usual country remedy.—New *milk*, with a proportion of *tar* equal to one-sixth of the milk, is highly spoken of.—A strong solution of *prepared ammonia* in water, often brings off a great quantity of air, and relieves the animal. Any of these internal remedies may be made use of when the hoving has recently taken place, and is not in a violent degree. But when otherwise, the introduction of an instrument is proper, and is now very generally resorted to. The one principally in use is a species of probang, invented by Dr. Monro, of Edinburgh, and which is particularly described in the *list of veterinary instruments* at the end. Another, consisting of a cane of six feet in length, and of considerable diameter, having a bulbous knob of wood, has been invented by a Mr. Eager, which is a more simple machine, but hardly so efficacious. It is probable that, in cases of emergency, even the larger end of a common cart whip, dexterously used, might answer the end. The introduction of any of these instruments may be effected by the help of an assistant, who should hold the horn of the animal by one hand, and the dividing cartilage of the nose with the other, while the operator himself, taking the tongue in his left hand, employs his right in skilfully and carefully introducing the instrument; the assistant bringing the head and neck into such an attitude as to make the passage nearly straight, which will greatly facilitate the operation. By these means the probang may be readily introduced, which is known by a large quantity of air immediately rushing out.

But when no such instruments can be procured; or as cases may occur when indeed it is not advisable to try them, as when the disease has existed a considerable time, or the animal has become outrageous, or the stomach so much distended with air, that there is danger of immediate suffocation or bursting; in these instances the puncture of the maw must be instantly performed, which is called *paunching*. This may be done with the greatest ease, midway between the ilium, or haunch-bone, and the last rib on the left side, to which the paunch inclines: a sharp penknife is frequently used: and persons in veterinary practice should always keep a long trochar, which will be found much the most efficacious, and by far the most safe, as it permits the air escaping certainly and quickly, at the same time that it prevents its entrance into the cavity of the abdomen, which would occasion an equal distention. As soon as the air is perfectly evacuated, and the paunch resumes its office, the trochar may be removed; and, in whatever way the operation is done, the wound should be carefully closed with sticking plaister or other adhesive matter. It is necessary to observe, that this operation is so safe, that, whenever a medical assistant cannot be obtained, no person should hesitate a moment about doing it himself.

After relief has been afforded by means of either the probang or the paunching, a stimulant drink may yet be very properly given, such as half a pint of common *gin*, or one ounce of spirit of *hartshorn* in a pint of ale, or two ounces of spirit of *turpentine* in ale: any of which may be used as an assistant stimulus. When also the cud is again chewed, still some relaxation of the digestive organs may remain: at first, therefore, feed sparingly, and as a stomachic give, for a few mornings, the following:—

Powdered camomile	half an ounce
Powdered oak or willow bark	ditto
White vitriol *(sulphate of zinc)*	one dram
Warm ale	one pint.

—

The *hove*, or *blown*, in *sheep*, is to be treated exactly in a similar manner; and a smaller instrument for introduction to their stomach, as invented by Dr. Monro, is sold in an improved form by Mr. Long. *(See Instruments at the end.)*

This affection is accurately described at length, with figures of the instruments used for its relief in France, by Mons. Chabert, a celebrated French veterinarian.

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LAMPAS.

This tumefaction of the rugæ, or ridges or bars of the palate, not unfrequent among horses, and particularly to young ones, has two origins: one from the inflammation sometimes attendant on the change of teeth, or the coming through of the tushes: the other, and I believe more frequent one, is dependent on some derangement of the alimentary canal, and is observed in young horses newly taken from grass into stable management; in which instances, if the alteration from open air and succulent food, to the more stimulating qualities of hot stables, warm clothing, and corn, be sudden, and without precautions, we cannot wonder that a febrile tendency, and consequent derangement in the alimentary canal, should follow. In ourselves, a similar enlargement and tenderness of the palate are the common consequences of this same state. It is usual, however, with farriers, to regard these tumefactions of the roof of the mouth, in every case, as mere local evils of the part itself; they therefore burn or stimulate them without mercy.

Treatment of Lampas.—In the first place, carefully examine the mouth generally, to see whether teething be going on. If the gums opposed to the tushes be tumid, slightly touch the skin with a lancet or bistoury, to reduce the obstruction offered to the protrusion of these teeth. Examine also the grinders in the same manner, as sometimes not only is much tenderness experienced in their passage through the gums, but now and then ragged edges will wound the cheeks, and bring on tumefaction of the whole internal surface of the mouth. Having become satisfied on these points, next carefully inquire into the more probable circumstance of derangement of the alimentary canal. Are there any appearances of worms? Has there been any late change of food? or has the horse been lately much confined? If none of these causes are apparent, it is yet more than probable that some lassitude may be detected; that the hair, hide, &c. will indicate some affection of stomach and general want of condition. In all which cases treat as directed under the head *Condition* (Section iv, p. 62); bleed, if there be much plethora or fulness, and internally give mashes with nitre and antimony: but if on the contrary there be weakness and emaciation, give malt mashes and stomachic alteratives. (See *Mat. Med.*) In either case, soiling with green meat, or a course of carrots, is proper. Little is to be expected from any application to the part itself. Slight scarifications however sometimes appear to lessen the tumefaction, and they always satisfy the owner. Under which view, the oxymellate of copper (*ægyptiacum*), or any other desiccative, may be applied to the part likewise, if required.

WORMS.

Every part of animated existence appears subservient to the purposes of other parts; and therefore every thing living may be considered as parasitic, clinging around other living matter for support. Insects, in an especial manner, appear to deserve this character; for many of them actually entomb themselves within other animals, either as their constant habitation, or as temporaneous tenants during their existence in some particular state *. Of the former kind, the veterinary art furnishes us with instances in the worms occupying the alimentary canal of the horse; and of the latter, the same art affords frequent examples in the horse bots, which are the grubs or larvæ of a species of winged fly, bearing the generic term of oestrus; to which may be added hydatids, together with other less defined entomological branches occasionally found within or upon the horse †.

Lumbrici.—The long white intestinal worms resemble earth worms in shape, are about eight or nine inches long, and are more often found in the small intestines than in the large. They are less common than bots, but may be considered as more prejudicial; now and then occasioning spasm, and perhaps inflammation, by their irritation.

Ascaris.—Thread or needle worms, so called from their filamentary figure, are sometimes found in the cœcum and rectum of the horse, in great numbers. The æquine ascarides are larger and darker than those of the human; but they are not, I believe, very prejudicial, unless when they exist in very great numbers; at which times they certainly occasion considerable disturbance in the system.

Trichocephalus Equi.—It is thus Mr. Clark designates the *whip worm*, occasionally found in horses; so called from its figure exactly resembling the thong of a horsewhip; being long, and larger at one extremity than at the other, which tapers, and contains the head. It is to the presence of this worm that Mr. Clark attributes the yellow matter on the anus, usually considered (but erroneously he supposes) as symptomatic of the existence of intestinal worms in general.

Tænia.—The tape worm is very rare in the horse; it has, however, been found, but the affections produced by it have not been noted.

Bots.—To Mr. Clark, not only the veterinary world in particular,

* Some of the insect tribe appear to occupy any living animal matter indiscriminately, and the parent fly deposits her ova wherever she finds a living receptacle. Usually, however, there is a choice in this respect. In the liver of rats and mice, a peculiar insect or worm is found. The fluke worm is almost confined to the biliary ducts of the sheep, as the larvæ of the œstrus equi are to the stomach of the horse.

† Hydatids, though not very common, are also occasionally found in the horse, presenting all the characters of the acephalocystes, and various other vermicular tribes have been likewise found within many of the tubular cavities of his body.

but naturalists in general, are highly indebted for his indefatigable research into this intricate branch of natural history. The genus oestrus, or gad fly, he informs us, furnishes several varieties which infest graminivorous quadrupeds; three of which he has described and figured, as peculiar to the horse. The *oestrus equi*, or large spotted winged gad fly, produces the more common bot, whose figure is well known as somewhat barrel-shaped, with a thick annular skin beset with spines around the joints.—*Oestrus hemorrhoidalis* is a fly with wings not spotted; the larva or bots of which are whiter and smaller than the former.—*Oestrus veterinus* is also a fly with spotless wings, producing oblong red bots, with smooth joints *. Mr. Clark's elaborate "*Treatise on the Bots of Horses*" affords us numerous classical proofs of the antient knowledge of the existence of the horse bots. Neither is an acquaintance with its origin from the gad fly of recent date; but the mode by which the parent fly deposited its ova, or gained an entrance for its larvæ into the stomach, was variously accounted for; but which accounts were divided between an entrance effected by the nostrils, or by the fundament. Linnæus supposed that one variety, the œstrus equi, penetrated the nostrils †, while the oestrus hemorrhoidalis he describes as entering the anus ‡. Mr. Clark has, however, satisfactorily proved, that the parent fly of the oestrus equi deposits its ova on the hairs of such parts of the horse as are within the reach of his mouth and nose, as the shoulders, within the fore legs, &c.; to do which the fly is seen to hold her body upright when preparing an egg: she rests for a moment on the horse, and fixes it to the hair by means of a viscid gluten; after which she again rises, and prepares another, until some hundreds are so deposited. These ova, or egg bots, form the little yellow granules so commonly observed adhering to the hairs of horses at grass in the summer. The oestrus hemorrhoidalis, Mr. Clark informs us, deposits her eggs on the nose of the horse; while the methods of the veterinus and salutiferus are not at present understood. These ova having become hatched, are by various accidents, as by the horse's licking himself, or nabbing others, carried into the stomach, where they instinctively attach themselves to the cuticular portion; very few ever reaching the villous or sensible part, to which we must, in a great measure, attribute their innocuous character. To enable these animals to resist the effects of alimentary friction, they are furnished with two tentaculæ, or hooks, of extraordinary tenacity, between which is situated their mouth, by which they suck up the gastric secretions §. Entering their abdominal habitation in the summer, the bots soon gain their full size, and continue within the

* If I be not mistaken, Mr Clark has more lately added another variety to his list, which he calls the *salutiferus*, and which inhabits the pylorus.

† Habitat in equorum fauce, per nares intrans.—*Linn. Syst. Nat.* 2, p. 960.

‡ Mire per anum intrans.—*Linn.*

§ That bots exist on pure aliment or chyle, as Mr. Clark supposes, is questionable. Even the chyme itself is hardly perfected in the cuticular portion of the stomach, much less is it concocted into chyle. Neither does physiology give us any reason to suppose that an unexcrementitious aliment is necessary to them, merely because they are situated in the stomach. The secundines are eaten by many animals, and the fæces of the young are devoured by the mothers of most indigent brutes, and are as readily digested as other matter. It is more probable that the mucous secretion of the stomach furnishes this variety with support, as the mucus of the nostrils supports other varieties of the oestrus.

horse until the following spring, when instinctively loosening their hold, they are passed along the intestinal canal, and ejected with the dung, preparatory to their change from larvæ into chrysalides, and from thence into parent flies.

Causes of Worms.—The causes producing bots have been explained as purely natural: those whereby intestinal worms are generated, are somewhat more equivocal; not that there is any doubt but that they follow the universal laws of living matter in their production, but that their choice of situation is dependent as much, or more, on some morbid change which the secretions undergo, which renders such secretions particularly grateful to them, than that they themselves are the cause of such morbific alterations. If it were not so, we should not find some breeds of horses, some ages, and those inhabiting some situations, or living on some particular diet, abound with them more than others. It is, however, probable that, notwithstanding diseased secretions are favourable to vermiformation, yet they are often found in those more healthy, or but little affected. It is also probable that, although they are frequently the consequence of disease, they are also occasionally the cause of it, particularly when they exist in inordinate quantities. It is likewise, I think, probable, that their more violently injurious effects, as spasmodic colic, inflammations, &c., are rather the result of some accidental irritation occasioned to the animals themselves, than from the immediate presence of the worms when unaffected by accidental causes, occasioned, perhaps, by some chemical change in the juices they feed on. When bots prove hurtful, it can only arise from an accidental change of their situation, from the cuticular to the villous portion of the stomach, which now and then, though but seldom, occurs; and in which cases they may and have proved injurious, and even destructive*. Mr. Clark fancifully supposes that bots are useful, and assist in the digestive process; but this not only wants proof, but is totally against analogy.

Symptoms of Worms.—The most popular symptom of the existence of intestinal worms, is the presence of a dry yellow matter adhering to the verge of the fundament, the origin of which is involved in some obscurity, and which is increased by the fact, that this matter is not invariably present in every instance, wherein worms exist in considerable numbers. It has been generally attributed to an excrementitious production of the worms themselves. Professor Peal, however, questions this, and attributes it to a morbid secretion from the rectum. Mr. Clark asserts, that out of three or four species of intestinal worms, this appearance is common only to one of them, the trichocephalus equi or whip worm; and that, in this instance, it originates neither from a morbid secretion of the rectum, nor from any excrementitious deposit of the worm, but is merely the soft structural parts of the animal itself, crushed by the anus in its passage through the sphincter.

Worms, when hurtful, occasion unequal appetite, and an irregular state of bowels; at one time costive, and at another loose, with glair or mucus around the dung balls. When ascarides prevail, the horse is much disposed to rub the tail, to ease the itching of the fundament. The presence of bots is seldom detected by any distinct appearance,

* Mr. Coleman, in his lectures to his pupils, relates an instance where bots had eroded the stomach, and had even penetrated the diaphragm.

except in the spring, when one or more may be detected half protruded through the anus, where one occasionally remains some hours and teazes the animal. The teres or round worm is the most hurtful to the general health, interfering with digestion and the regular alvine discharge when in great numbers; by which the horse, although he may eat heartily, does not thrive. The skin also, sympathising with the stomach and intestines, occasions a staring coat and harsh feel of the hair. There are frequent attacks of slight gripes: the horse stands with his legs wide apart and his belly low. The breath is often hot and fœtid, and it is not unusual for there to be a short dry cough.

Treatment of Worms.—Nature has endowed these animals with such tenaciousness of life, that few matters known to us will effect their destruction. Bots are so hardy as to survive immersion in oil, in alcohol, spirits of turpentine, and even powerful solutions of mineral acids. The continued use of salt as an article of food is, however, thought to prove so obnoxious to them, as to make them quit their hold and become ejected. Bitters, purgatives, and the mechanical irritation of pointed bodies, as pewter, tin, &c. filed, have no effect whatever on them: but with regard to the other vermiforms, rather more success may be expected from medical aid, in the form of vermifuges.

In cases where indigestion is strongly marked by an irregular appetite, give a course of bitter tonics, under a supposition that the dyspepsia is rather a cause than a consequence of the worms. It has been attempted to effect the removal of worms mechanically, by dissolving the mucus they are supposed to be embedded in, for which lime water has been used, injected by clyster up the rectum, and which practice is most to be depended on in the ascaris; strong purges are still more commonly given with the same intent. Remedies have likewise been recommended to destroy them within the body, by the mechanical irritation they occasion through the medium of speculi. Under which view, filed tin, brass, iron, and pewter, are given. The *Cevadilla*, or Indian caustic barley, *Spigelia Marylandica*, or Indian pink, are reputed vermifuges against the teres and ascaris. The oil of turpentine has also been strongly recommended, as an excellent general vermifuge; but, except for the destruction of the tænia, it certainly does not appear to deserve that character to the other varieties. The following formula will be found a useful one for the removal of *intestinal* worms:—

Submuriate of mercury *(calomel)*	eight grains
Powdered arsenic	eight grains
Pewter, or tin, finely scraped	one ounce
Venice turpentine	half an ounce.

Mix into a ball, and give every morning fasting for a fortnight, unless it should prove too diuretic.

Œstrus Bovis, *producing* Puckeridge *in* Cattle.

A dipterous insect, which country persons call *wornulls*, or *wormuls*, settles on the backs of oxen, cows, and calves, and punctures the skin, depositing its eggs therein, between it and the cellular membrane: these eggs become larvæ or maggots, which, by the irritation they occasion, produce the formation of pus or matter, on which they feed. The tumor they occasion is called *puckeridge*, and is erroneously attributed to a wound inflicted by the goatsucker, or evejar. When arrived at their full size, the larvæ make their way out at the external opening, and fall on the ground. From the mischief which they do to the hides, their destruction should be attempted, which may be effected by introducing a hot wire, or by pressing the part.

Œstrus Ovis, *or the* Frontal Worms *of* Sheep.

Sheep are observed, in summer, to gather together in clusters, carefully guarding their head, which is to avoid the attack of this insect, in its attempts to lay its eggs on the inner margin of the nose; which, having effected, it departs: these eggs become larvæ, and creep up into the frontal and maxillary sinuses, occasioning great irritation. The continental shepherds trepan their sheep, and remove them; but our shepherds have not been successful with this method. Sheep are also obnoxious to a worm called the pallisade (*strongulus felona*), which seats itself within the trachea and bronchiæ.

The Fluke Worm *in* Sheep.

This worm is said to be found in horses and asses. In rats it is sometimes also found; but in sheep, goats, and deer, it is very common, and is supposed to occasion fatal dropsies, and a tabid disease of all the abdominal viscera, and the effects are thence called the *rot*. It is, however, not altogether certain, in this instance likewise, whether the fluke worms are not more a consequence than a cause of disease. Although much inquiry has been made on the subject of this malady, it is still involved in some obscurity. The animals affected with it gradually become dropsical and tabid, losing their coat in the latter stages of the complaint; and from being first costive, finally become affected with obstinate diarrhœa. It appears, however, certain that it is originally occasioned by the effects of unusual moisture, and, therefore, it is almost the certain consequence of rainy wet seasons; or, indeed, any imprudent confinement to damp pasturage: but it is remarkable that sheep fed in salt marshes, however wet, are not found to contract the disease. It is said that Mr. Bakewell, when his sheep were past service, used purposely to rot them, that they might not pass into other hands; and this he did by overflowing his pastures, when the sheep fed on them were sure to be rotted in the following autumn. *Salt* seems not only a preventive, but it appears also a cure in the early stages of the disease. Salt appears the principal ingredient of efficacy in Mr. Flesh's patent remedy. An early removal to higher ground is, however, the most effective remedy.

Hydatids *or* Staggers in Sheep.

Within the cerebral cavities of sheep a vesicle is often found, and produces effects which have received various provincial names; being called by the French *tournis*, by the Welch *pendro*, by some English *gid*, by others *staggers*, *goggles*, *sturdy*, *turnsick*, &c. It is very universal throughout Europe, and indeed affects the flocks of most quarters of the globe. The researches of naturalists have satisfactorily traced this vesicle to belong to the tænius globuleux *(cœnurus cerebralis)*, or hydatid. Its vitality is fully evinced on being put into water, which if it be warm, excites lively motions in the animal. It presents, when detached from the body and expanded, a transparent lucid membranous surface, interrupted by numerous small opaque white spots, which are supposed by some naturalists to be the germs of other hydatids, and muscular organs by others. Perhaps they are the mouths of the animal. Their size varies from that of a pigeon's egg to the minutest vesicle. How they insinuate themselves within the head is unknown, but they are found sometimes solitary, and sometimes two or three are placed together, situated within the ventricles of the brain; sometimes within the substance of the cerebellum, but more frequently immediately on the surface of one cerebral hemisphere. It is said they are more common to the right ventricle than to the left; but my experience in the disease is too limited to prove or contradict the assertion. In consonance with the usual cerebral phenomena, its effects are generally produced on the opposite side to that on which the parasitic animal is placed. Thus when in the right ventricle the left eye is usually found to suffer, and the paralysis is also found on that side. When the disease has existed some time, the ravages it occasions are very great: one of the cerebral lobes has been found almost destroyed; one of the ventricles has been distended to ten times its original magnitude: while in other instances, one of the parietal bones has become so absorbed by the pressure of the hydatid, when situated on the cerebral surface, as scarcely to offer the smallest resistance to the touch. It is more frequent in sheep under two years old than at a later period.

The *symptoms* of cerebral hydatids are a staggering gait, and a separation from the rest of the flock; the affected sheep holds the head unnaturally low or high, and is disposed to carry it more to one side than the other, and sometimes he inclines in all his movements so much to the same side, as to describe almost a circle in his gait. It is not unusual also for the affected sheep to pass much of his time on his rump. As the pressure of the hydatid vesicle increases, the animal functions become still more deranged; the sheep staggers about almost unconscious, with dilated pupils, and loss of cud; until coma or convulsions close the scene.

Many attempts at *cure* have been devised, but hecatombs of victims have fallen under unsuccessful treatment. Experience has, however, been derived from all these; and it is now ascertained that no means short of the destruction of the hydatid can prove salutary. For a long time it was supposed necessary to this end, that the whole of the vesicle should be extracted; in doing which many sheep were lost, while many others were suffered to die from a repugnance or dread to operate so roughly: but since it has been ascertained, that the simple puncture of the hydatid sac, and the evacuation of its contents, is sufficient to ensure its destruction, and which, if performed in a moderate time after the attack, ensures a cure, it has been more commonly and successfully attempted; and this more particularly when the vesicle is situated on the surface of the brain. The immediate existence of the hydatid is usually betokened by a protrusion of one side of the skull, usually of one of the parietal bones, which on being pressed will yield to the touch. To a *cure*, our attempts should be directed to puncture the vesicle by means of any instrument that will penetrate the bone with safety, after a slight opening has been made by a scalpel. A rude, but by no means an ineligible instrument, is a fine sharp gimblet, which will effect a sufficient opening if passed as far as its screw, or until the hydatid fluid flows, and will prove effective, by evacuating the vesicle without danger of wounding the brain. After the operation, in whatever way performed, should the symptoms not mitigate, there will be reason to suspect that a second or third hydatid remains, in which case the trephine must be resorted to. After the operation, stitch up the integuments, and secure the head from the effects of cold, violence, or insects. Continental shepherds effect a rude cure by introducing a long pointed instrument up the nose, through the frontal sinuses, and into the cerebral cavity, by which means the hydatid is effectually destroyed; and ill consequences less frequently result, than would be supposed from such treatment.

COSTIVENESS.

Some horses are habitually costive, which arises either from a defective secretion of the fluid of the bowels; or, that the absorbents act too strongly, and take up too much of the liquid contents, by which the fæcal mass becomes dry, hard, and difficult to pass; or it may, and frequently does, arise from a defect in the formation of the bile, either as to quantity or quality. This we know from what occurs in jaundice, in which, from a loss of the bile by extravasation, there is always present a strong disposition to a costive habit. Some food is prone to occasion constipation, as whatever is stimulant and heating. Corn of all kinds, therefore, has this tendency, but beans more than all. *Habitual costiveness* should not be counteracted by purgatives, as they generally increase the evil; but attention should be paid to the habit itself, and the peculiar tendencies of that should be counteracted. Dry food should be remedied by occasional bran mashes, and the same should be done when the disposition is occasioned by a natural heat in the temperament of the body. Green meat is particularly useful in these cases in summer, and carrots in winter. When costiveness arises from defective bile, treat as directed under jaundice.

Occasional or *accidental costiveness* must be treated differently. First, back-rake, next throw up a laxative clyster (see *Clysters, Mat. Med.*); and then proceed to give a purgative by the mouth, milder or stronger according to circumstances.—See *Purges* and *Laxatives, Mat. Med.*

DIARRHŒA, *or* LOOSENESS.

Diarrhœa.] [Cours de Ventre.

This complaint is properly an increased action of the peristaltic motion of the intestines, with a greater secretion of a watery fluid within the intestines; or, otherwise, a want of a proper absorption of the fluid part of the intestinal contents; whereby there follows a frequent evacuation of the dung in a very liquid form. It is distinguished from dysentery by the purging being complete from the very first; by its being more copious, having all the fæces in solution without a glairy mucous matter, erroneously considered as the fat of the body; and, also, by being seldom accompanied with fever, or any great affection of the general health, unless it be long continued. Some horses are very liable to purging on every exertion, and such are termed, by grooms, *washy*, having usually narrow chests and lank bellies, by which the intestines have not sufficient room for their natural processes, but are pressed on, and thus forced to a hasty expulsion of the unassimilated contents.

Causes.—Diarrhœa may arise from mechanical pressure, resulting from the form; or from a constitutional debility in the intestines themselves, dependent on the causes abovementioned. A weakened state of the bowels, inclining to this affection, is often brought on by drastic purges likewise. These may be all considered as *constitutional* causes, and such as are liable to a frequent recurrence; but beside these, there arises a more active and serious affection dependent on some morbid change taking place in the secretions of the stomach and bowels, whereby those secretions become a source of irritation to the organs themselves. The *bile* very commonly takes on such a change, and there is reason to believe that this is a fruitful source of diarrhœa. The food itself likewise becomes, at times, improperly assimilated, and enters into new combinations with the gastric juice, whereby an acrid matter is formed: this matter has been supposed to be an acid, and hence absorbent earths have been much used in this complaint. Horses moving from hay to grass, or even from grass to hay, become affected with looseness; for the stomach and bowels prove unequal to the office of assimilating a new food at once, and hence they are irritated to an early expulsion of their contents, as a matter foreign and incapable of perfect assimilation.

Diarrhœa may be *symptomatic*, or the effect of some other complaint, in which case it ought not to be too hastily checked. It is frequently occasioned by the sudden application of cold, whereby the exhalent arteries of the skin becoming checked, more fluid is necessarily thrown on the intestines; and which operates not only by increasing their quantity, but likewise by the addition of something foreign, and hence irritating to them. In such case, the restoration of the healthy action of the skin is necessary to a cure; and as the balance of power *has* been in favour of the intestines, it would be desirable *now* to turn it in favour of the skin, by making use of the few sudorifics we know of, as *sp. Mind.*, *warm clothing*, &c. &c.; and by avoiding the use of active astringents. It may, however, be remarked, that horses are not much subject to symptomatic purging, or looseness, and therefore there is less danger of checking such affections in them than in the human subject.

Prognosis.—It is seldom dangerous, unless very violent, or long continued; or unless, by improper treatment, it should inflame the inner surface of the intestines, and thereby degenerate into dysentery or enteritis.

The *Treatment.*—It is so very seldom, as before observed, that this complaint is *critical* or purely *symptomatic*, that it but rarely requires aperients to commence the cure with; but mild astringents may in general be at once proceeded on. The longer the complaint continues, the farther it proceeds along the alimentary track, so that, at the last, the cœcum and rectum become equally affected, and then a distressing tenesmus prevails. This circumstance is not sufficiently attended to in the cure of diarrhœa, for in these cases it will be often in vain to give astringents by the mouth, which become so changed in the long alimentary track, as to reach these latter bowels almost inert; but in such instances, astringent injections will frequently effect all we wish. Commence, however, the cure of the general cases of diarrhœa by giving the following drink once or twice a-day, according to the violence of the complaint:—

No. 1.—Prepared opium	half a dram
Powdered catechu	two drams
Prepared chalk	two ounces
Starch, boiled thin	a pint.

Mix.

In very obstinate looseness, half a dram of *alum* may be added, and the quantity of opium doubled; and in such case, and also whenever the affection has been long continued, once or twice a-day give the following clyster:—

Boil six poppy heads in four quarts of water to two, add to the liquor

Prepared chalk	two ounces
Boiled starch	two quarts.

Mix.

To this also, if necessary, alum may be added; and should the horse be weak, boiled starch, or arrow root, or boiled bean meal, may be horned down the throat frequently, Give no cold water to drink, but, instead, give thin gruel or rice water, chilled. Clothe warmly, encourage a warm temperature also, and carefully avoid exposure to sudden currents of cold air. To the more intimately understanding of this complaint, under its several varieties, see the subject of Dysentery.

For the cure of diarrhœa when brought on by superpurgation, Mr. Bracey Clark recommends

Sulphat of soda (*Glauber's salt*)	two ounces
Sulphat of magnesia (*Epsom salt*)	one ounce
Muriat of soda (*common salt*)	ten grains
Sulphat of iron (*green vitriol*)	two grains.

Mix in warm water and give, repeating it if necessary.

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DIARRHŒA *in* CATTLE.

Cattle Looseness, *Scouring Cow*, *Scantering*, *Scouring Rot*, are, all of them, terms used by cowleeches and persons about oxen and cows, to express diarrhœa, or alvine flux, which is much more frequent in kine than horses, and also more obstinate and fatal. To a proper treatment of this complaint, it is necessary to consider it in a different point of view to what it has been generally regarded. There are, in fact, *three kinds of scouring* in cattle. A *dysenteric*, already considered, having an inflammatory origin. An *acute* diarrhœa; and, a *chronic* diarrhœa: and it is from usually blending the acute and chronic into one point, that the disease generally, has been misunderstood, and that the means adopted for its *cure* have been so various and absurd: for among the remedies employed by persons about cattle, are hog's dung, turpentine, and butter-milk. Dock root boiled in salt and water; and nettle root, in forge water; are also in use: as likewise red sanders and milk, and sulphur and diapente; while some cow-leeches simplify their treatment still more, and give only salt and spring water.

Acute Diarrhœa.—By this I would distinguish that kind which comes on suddenly, and with a known and apparent cause; such as overheating by inordinate exercise; drinking cold water when hot; a sudden change of food, &c.; all which cases may, in general, be easily and successfully treated. The *appearances* are, a listlessness and shifting about, with a very frequent fæcal discharge, in which the hay, grass, or other matters eaten, often appear half digested only. Sometimes the stools are slimy and frothy, but in the *acute* kind they are seldom dark coloured, except the liver be inflamed. As soon as the complaint is discovered, if the subject be at grass, immediately move into a shed, and feed on hay; and should the appetite be much affected, try the oil cake, or whatever will please; but, if wholly lost, drench frequently with bean flour or oatmeal gruel, as it is of more consequence than is generally supposed to support the strength immediately. The following drench may be given, night and morning: –

No. 1.—	Powdered alum	half a dram
	Prepared chalk	two ounces
	Starch, boiled moderately thick	a pint.

Mix.

Should this prove insufficient to check the purging, add to each drink the following:—

Powdered opium	half a dram
Powdered ipecacuanha	two drams
Powdered catechu	ditto.

And, in very desperate cases, throw up also an astringent clyster (see *Materia Medica*), and clothe the body, or foment the belly with a decoction of poppy heads.

Chronic Diarrhœa.—This is considerably different from the former in origin, appearance, and in the obstinacy that usually characterises it. It may arise from any thing tending to reduce the animal beyond a certain limit. Oxen who have been driven long distances, if fat, become affected with dysentery; but if they are lean, and low in condition, they take on the *scouring rot.* Cows, suffered to suckle two calves, or not sufficiently fed when long milked, are liable to it; and now and then it follows exposure to bad weather, particularly in impoverished animals. Bad food is also a common cause of it. The symptoms of this more slow continued kind are, a frequent stooling of liquid matter: the appetite is seldom much impaired at first; sometimes, on the contrary, it is increased. The evacuations are much darker and more fœtid than in the former kind, and, as they drop away, a lighter yellow fluid follows, leaving a frothy head to the fæcal mass. The animal loses flesh, the eyes look yellow and are sunk, and the graziers affect to tell the existence of the complaint by the tenderness of the animal across the loins, but which does not always exist; and much oftener I have found the beast tender in the belly towards the right side. I have had opportunities of observing the morbid appearances of several of these cases after death, and in every one of them there were great marks of visceral affection: in some, the mesentery was enlarged; in others the kidneys have been injured; in a very few, the intestines themselves exhibited appearances of primary affection; but, in every one, a diseased liver has been a marked characteristic; and, I believe, to this origin may be ascribed almost every one of these cases, and to which source we are also to look for the obstinacy and fatality of the complaint. In some, the liver has been indurated and lessened; in others, it has been indurated and enlarged; while, again, a third case may present this gland much enlarged, but much softer than natural, and, when cut into, having cells filled with pus or matter.

The *Treatment* of this kind of scantering, or rot, does not always succeed, however judicious; the immediate looseness is the least part of the complaint, for it only arises from a diseased bilious secretion, which proves a continual irritation to the bowels. However, the cure may be commenced by attempting to check its violence by the drink No. 1, before prescribed. But when the flux is a little checked, or in case that remedy is not found equal to it, proceed as follows:—Cut the hair from the belly, principally from the right side, beginning at the navel, cutting forward, around and upwards, towards the sides, making a surface of fourteen or fifteen inches in diameter. Rub into this, every day, half an ounce of strong mercurial ointment, and every morning give the following:—

Green vitriol	half a dram
Powdered opium	half a dram
Powdered gentian	one ounce
Boiled starch	one pint.

Feed liberally, and give bean meal in a mash or otherwise; and, if symptoms of salivation appear, omit the mercury, but continue the drink. I have used the prepared rust of iron, half an ounce in a ball, with advantage in these cases; but the benefit of the mercurial course is apparent in every instance of hepatic disease, and it is but very few of these cases but have their origin in biliary affection.

Scouring *in* Calves.

From a morbid stomach secretion, calves are very prone to diarrhœa; to remedy which, graziers give them chalk to lick. When the looseness has already appeared, they also give chalk in milk: others give suet boiled in milk, and which is an excellent domestic remedy: as likewise starch or bean flour boiled in their food. But when these fail, give the following, which is almost certain in its good effects:—

Prepared chalk	half an ounce
Powdered opium	five grains
Powdered alum	ditto
Suet and milk, boiled	half a pint.

Sheep are subject to both the acute and chronic scouring; and *Lambs* are also liable to a similar looseness with calves. In either case, the rules already laid down exactly apply, making one-third of the quantities of the remedies the exhibited dose.

CRIBBITING.

This peculiar action is very generally, but erroneously, supposed to arise from a small quantity of air drawn into the stomach; and is hence called *sucking the wind*. But I believe this idea of it to be very incorrect; and that, on the contrary, it consists in the simple eructation or forcing out of a little gas, let loose from morbid combinations within the stomach, which, as it proves a source of irritation to the organ, and painful to the animal; so, to promote its expulsion, he applies his teeth to a fixed point, by which he gains the aid of some of the muscles of the fauces to open and straighten the œsophagus, while, at the same time, by means of the abdominal muscles, he presses on the stomach, and forces out a little of the irritating air. Exactly the same process takes place in ourselves, except that we have no occasion, from the peculiar shape of our pharyngeal opening, to gain a fixed point for the teeth; but, in every other respect, human eructation in dyspepsia is conducted in the same manner. It also appears that, from a morbid sympathy, that symptom of dyspepsia called heartburn in the human, is felt at the upper part of the throat; and it is more than probable the same occurs in horses, which will partly serve to account why a strap buckled tolerably tight round the upper part of their necks puts a stop to the action. The sensation in the *part* is, by this means, altered or deadened; and such a horse is also conscious that he can by no effort any longer increase the dilatation of the pharynx.

That cribbiting is dependent on dyspepsia there are many proofs. Turning out to bad keep, particularly in a straw yard, is a fruitful source of it. Bad hay, musty oats, or other indifferent food, will also occasion it; and it is likewise observed to come on spontaneously in *high-fed* horses who are much confined in the stable; in which cases persons erroneously consider that it is acquired from idleness or tricks; and as, perhaps, others so situated may become the same, these instances are then equally erroneously attributed to catching it from one another. The fact is, that the confinement breeds dyspepsia, and the animal commences cribbiting to relieve himself. Another proof of this is, that cribbiters seldom accumulate flesh: it is not the mere action of cribbing that can prevent this; it is the dyspepsia or affection of the stomach that does it.

As stated above, the simple action may be prevented, but the effects are not obviated, for such horses do not accumulate flesh afterwards. They however are prevented from wearing the manger, or their own teeth, and a stop is also put to an unpleasant noise. The strap placed round the neck should be not less than two inches and a half to three inches broad; and care should be taken that it is tightened only to the degree necessary to stop the cribbing, without injuring the animal*.

* When treating of *roaring*, p. 445, we had occasion to point out the danger resulting from too tight a neck strap, which may occasion such injury as to bring on this affection, in addition to the other.

In several instances, at the commencement of the complaint, I have cured it by alteratives, and by turning out: but when it has existed some time, the formation of air becomes natural to the animal, and the habit is never relinquished.

HERNIA.

Hernia, which is popularly called *rupture,* though in many cases erroneously so, is the displacement of some of the abdominal contents from the cavity outwards, by some of the natural or by some artificial openings. Any abdominal viscus may become displaced; but it is by far most common to the intestines. When such protrusion takes place through a capacious opening, and the protruded part can be readily returned, it is called a *reducible* hernia; but when it occurs through a small opening, and cannot be returned, it is *irreducible.* If the mouth of the sac around the intestine constringe, and produce inflammation of the gut, it then forms a *strangulated* hernia, and usually proves fatal, unless relief be promptly obtained. From the prone situation of the horse, although the scrotal cavity remains open to the abdomen, yet scrotal hernia is very unfrequent, particularly among geldings. Bubonocele is, however, more common, for a force not equal to protrude an intestine into the scrotum may yet carry it into the inguinal opening, and lodge it in the groin. As might be expected, in those countries where castration is omitted, both of these herniæ are more frequently met with, and often occasion little inconvenience *. Epiplocele, so common to fat dogs, is unknown in the horse, from the shortness of his omentum. Accidents, as violent kicks, ox or cow gores, &c., may produce ventral hernia in any part of the peritoneal cavity, either with or without a peritoneal pouch †; while the displacement of the intestines into the natural openings is more frequently effected by violent exertions. It is by no means unlikely, that many horses die from strangulated hernia, whose death is attributed to simple enteritis or other causes: the prudent veterinarian will, therefore, do well to always examine a horse whose symptoms betoken inflammation of the bowels. Most cases of reducible hernia, originating in accident to the parieties of the abdomen, can only be supported by bandage; the great force of the abdominal muscles, and our inability to confine the animal perfectly still while the parts unite, prevent their permanent reduction. Neither have we much more hope of permanently effecting a cure of either bubonocele or scrotal hernia, although the temporary reduction of the protruded gut may commonly be effected by the application of the taxis (i. e. pressure), particularly when the horse is cast on his back, and his hips elevated.

The *Symptoms* of strangulated hernia are so exactly similar to those of enteritis, as to render recapitulation of them unnecessary: the same uneasiness, shifting of position, getting up and lying down again, are here seen also. I have heard that horses have been known to roll

* Mr. Percevall mentions having seen a horse at the Veterinary College with a protrusion of intestine behind the cartilages of the false ribs.

† "Beaucoup de chevaux ont de ces hernies sans en souffrir et ce n'est que quand elles sont trop considérables, qu'elles leur nuisent."—*Huzard.*

on their back to relieve the scrotal or inguinal strangulation; but I never myself saw this done. The animal paws, looks at his flanks, while cold sweats bedew his frame: his pulse is extremely quick and small. If it be a stallion, the testicle of the affected side will probably be found drawn upwards, and closely embracing the hernial sac, while the other remains pendulous.

The *Treatment of Strangulated Hernia.*—Having ascertained the existence of scrotal or inguinal hernia, cast the horse, and both by soothing means, as well as by the judicious applications of restraints, as hobbles, side lines, and plenty of assistance, endeavour to keep him as quiet as possible, with his hind parts elevated. We will suppose him to have been previously blooded to the amount of several quarts, back raked, and clystered with a tobacco injection. Proceed, by the application of the taxis or pressure, to attempt the reduction of the hernia. If it prove very obstinate, introduce the arm within the rectum, and endeavour to direct the hand, so as to discover the abdominal ring; which having done, attempt gently to draw the strangulated gut out of its confinement, assisting its retraction with the other hand, all which must be so done as to avoid injuring any of the parts. If all attempts by these means fail, recourse must be had to the division of the constricted part of the hernial sac by the following means: Having loosened the hind leg of the hernial side, draw it forward and upward. If the horse be on his side, draw it forward only; but if on his back, as before directed, forward and upward: proceed to open the scrotum* very carefully, and by minute touches of the scalpel, in case the intestines fill the scrotum: but if it lie concealed in the groin, make the scrotal opening more freely, and passing up the finger along the spermatic cord, endeavour to discover the situation of the intestine and the strangulating stricture: which having done, introduce a blunt-pointed bistoury, still further guarded by being carried on one of the fingers, with the edge sideways, towards the abdominal ring. In this way, carefully effect a dilatation of the stricture upwards and outwards, sufficient, and only just sufficient, to admit of a free return of the protruded gut; which being done, secure the wound by compress, and by padded bandages, tending to impede the future descent of the intestine. In performing this operation on the Continent, where it very frequently occurs, my friend, M. Huzard, informed me it was not unusual to castrate at the same time on the hernial side: by which a *permanent* cure was frequently effected, the inguinal opening completely closing afterwards.

* In a very able description of the method of performing this operation in India, by Mr. Hodgson, V. S., and introduced by Mr. Percevall into his Lectures, vol. ii, p. 60, it is particularly recommended to make the first incision at the lower part of the scrotum, which not only facilitates the operation, but leaves a dependent opening in case of future abscess, which has frequently occurred.

CLASS VI.

DISEASES OF THE GLANDS.

JAUNDICE.

Icterus.]

THE *yellows*, as jaundice is called by farriers, is, as a distinct affection, unfrequent in the horse, from his liver being less complex, having only hepatic but no cystic bile. But, as a symptomatic affection, it is sufficiently frequent; for whenever any great abdominal inflammations occur, the liver is liable to participate; bile then passes into the blood vessels, and from thence is thrown on the skin. Now and then, however, a more slow and primary affection of this organ occurs, and the bile is either increased in quantity, altered in quality, or obstructed. In the former case, purging accompanies the other symptoms: in the second, the evacuations are ordinate; but they are constipated in the third and most numerous variety; and, in all, the bilious tinge of the skin is invariable.

Symptoms.—The inner surface of the eyelids, nostrils, and mouth, looks of a dingy yellow; frequently the dung is hard, dry, and sparing; there is also a particular listlessness, and early fatigue, about the animal, with hot breath, sickly appetite, and high-coloured urine.

Treatment.—We must attempt to produce a healthy action in the liver, or we must remove its obstruction. To promote these intentions (as in the greater number of cases costiveness is present), begin by giving the following:—

No. 1.—Calomel (*submuriate of quicksilver*)	one dram
Aloes	two drams
Powdered gentian	ditto
Castile soap	ditto.

Form into a ball, and give night and morning until the bowels are actively purged; and then continue only so much of the same, for a week or ten days, as will keep them lax, but not in a purging state. If the symptoms be at all violent, or such as betoken inflammation, bleed and blister the sides: a rowel also in the belly may be applied. In cases where costiveness is not present, but, on the contrary, a relaxed state of the bowels appears, give the following, which is also proper as a tonic for the *latter* stages of the former kind of affection:—

No. 2.—Submuriate of quicksilver (*calomel*) ...	twelve grains
Sulphate of copper (*blue vitriol*)	one dram
Gentian, in powder	three drams
Oak bark, ditto	ditto
Camomile, ditto	ditto.

Make into a ball, and give night and morning, unless the calomel should affect the mouth, in which case give only one a-day; and should the looseness increase on this plan, add powdered opium, half a dram to each ball. In all cases of *yellows*, a change of food is proper, and generally necessary. In winter, spear the corn, or give carrots; in summer, soil, or turn out to grass; but, in such case, avoid exposure to the night air, and keep on a rug in the day so long as the calomel is continued.

JAUNDICE *in* OXEN *and* SHEEP.

THESE animals having a gall bladder and cystic duct, are more liable to biliary *obstructions* than horses, and hence this complaint is more frequent among them. It is very common in some of the cold provinces on the Continent, where these animals are stall-fed in winter; from which, numbers of them are attacked with it in the spring. The cure is promoted, in these cases, by turning them into grass lands. In England it is less often the consequence of confinement than of a slow inflammation of the liver. In such instances, therefore, treat exactly as detailed under this head in horses, regarding, at the same time, the strength and size of the beast.

INFLAMMATION OF THE SPLEEN.

Splenitis.]

I NEVER met with this disease in my own practice, but I have lately heard of a very well authenticated one, in which the symptoms so exactly resembled hepatitis, as to be mistaken by a very observant practitioner for that. An active and judicious treatment was promptly pursued, but the violence of the disease destroyed the horse on the fourth day. On examination, the spleen was highly inflamed and nearly gangrenous, while the surrounding viscera were unaffected.

A chronic enlargement of the spleen is less rare, and produces symptoms not unlike jaundice, even to the yellow tinge of the skin. Rupture also of the spleen occasionally occurs.

BLOODY URINE.

FARRIERS term this *pissing of blood:* it arises sometimes from inflammation of the kidnies, in which case it must be treated as under that head: it may accompany a stone in the cavity of the pelvis of a kidney, or an ulceration of any of the urinary passages; but these are unusual causes. Violent exercise, by rupturing the small vessels of these glands, produces it more often, and therefore it frequently follows hard riding.

The *Cure* must consist in restoring the healthy action of the parts, and promoting a healing of the vessels; and, particularly, in avoiding violent exercise and heavy weights. Diuretics are always hurtful. Mild astringents are proper, as alum, catechu, dragon's blood, logwood, &c. I have also known great benefit to be derived from a large strengthening plaister across the loins. In one instance, the following, given once a-day, produced excellent effects, after many other means had failed:—

Acetate of lead	ten grains
Vitriolated zinc	two scruples
Catechu	four drams.

Make into a ball with conserve of roses.

In another obstinate case, a permanent cure was effected by turning to grass, having first covered the loins with a strengthening charge.

Bloody Urine *in* Cattle.

This disease among cattle is called *red water*. When there are strong marks of fever, the complaint probably proceeds from inflammation of the kidneys, and must be treated as under that head; but when the symptoms are milder, and the urine is only slightly tinged with blood, then treat as is recommended above.

PROFUSE STALING.

Diabetes.]

A disease much resembling the human diabetes is sometimes, though not frequently, met with in the horse. Now and then it assumes all the diabetic characters of the human disease: in most instances, however, it is simply an inordinate increase of the urinary secretion. It is first detected by the making of five or six times the natural quantity of urine, which is milky or watery, and now and then, as before stated, in very bad cases, it deposits a sediment, which, when subjected to experiment, does not materially differ in taste, colour, or appearance, from common sugar. It is attended, in these latter instances, with great emaciation, for the absorbents act violently, not only on the fluids, but on the solids, converting every thing into a compound, from whence this fluid discharge is formed: hence the weakness is great, the thirst excessive, and appetite voracious; the pulse is likewise usually quickened. But in the more ordinary cases of the *pissing evil* of the horse, the kidneys appear to be topically affected with a *simple increase* of their action, brought on by the effects of some diuretic matters taken into the stomach, as bad hay, musty oats, &c.; and not unfrequently, from the exhibition of violent diuretics and drugs, something like a morbid action continues: but less frequently does it appear to arise from a deranged state of the digestive and assimilating powers, as is suspected in the human.

Treatment.—When this disease, as is usually the case, arises from improper aliment, it must be immediately changed; and, therefore, when no other apparent cause is manifest, the food ought to be particularly examined. When it occurs from the use of violent diuretics, moderate doses of catechu and alum, with oak or willow bark, will effect a cure. When, however, from its violence, and the presence of a sweet taste in the urine, there is reason to suspect that the disease exists in a deranged secretory structure of the kidneys, and is not the mere effect of external stimulants; or, perhaps, originating in a diseased absorbent or assimilating system; in such cases try the following:—

Liver of sulpher (*sulphurated potash*)	two drams
Uva ursi, in powder	four drams
Oak bark, ditto	one ounce
Catechu, ditto	two drams
Opium, ditto	half a dram.

Mix with a pint of rill water, or other liquid, and give daily. In very desperate cases, instead of other drink, broth or tripe liquor might be substituted. In case benefit is not apparent from this treatment, try the following twice a-day:—

Nitrate of quicksilver	ten grains
Extract of belladonna	ten grains
Conserve of roses to form a ball.	

CLASS VII.

DISEASED COLLECTIONS OF FLUID WITHIN CIRCUMSCRIBED CAVITIES.

DROPSY OF THE HEAD.

Hydrocephalus.]

I NEVER heard of more than one or two instances of this disease in the horse; but it is not unlikely to occur, from previous inflammation of the brain, by which serum may be poured out into the cerebral cavities. The *Symptoms* greatly resemble those of staggers, and the *Cure* will be best promoted by medicines exciting the waste of the watery parts of the blood, as diuretics; and of those also which excite the absorbents, as mercury, &c.: blistering the head would be also proper, and rowelling the throat.

DROPSY OF THE CHEST.

Hydrothorax.]

THIS, as a primary affection, is a rare occurrence, but, as a secondary one, it is very common; and then consists in a collection of fluid within the cavity of one or both pleuræ. It is said that it sometimes appears encysted, by being separated from the general thoracic cavity by a membranous sac. *Hydrops pectoris* forms a very common termination of pneumonia, and appears to arise in these cases from a peculiar disposition on the part of the exhalent arteries of the pleuræ to secrete an inordinate quantity of serous interstitial fluid, during the active symptoms of pneumonia, or towards its close. Many gallons of fluid have been found so formed, within a very short space of time. In some instances less rapid, the fluid has been discovered mixed with pus or matter; and in many others, coagulable masses are found floating in it.

Causes and *Symptoms*.—These are so fully described under the head Pneumonia, p. 416, that we shall not enter on them here.

The *Cure*.—It is seldom that we can detect the disposition to inordinate secretion sufficiently early to attempt any means to restrain it; and when formed, we have seldom power enough over the absorbents to effect its removal through their agency. It is, however, always our duty to attempt it: and as Nature now and then effects a natural cure, we may occasionally assist her efforts. It has been recommended to bleed, if any inflammatory action remain; but it is very seldom, when the affection is formed, but that such a practice would be highly injurious; and the result would prove that we had mistaken cause for effect, as the febrile symptoms, when remaining, are consequent to the irritation occasioned in the system by the presence of the fluid. Nauseants to promote absorption, and mild diuretics to lessen the serum of the blood, generally bid fairer; and these I have tried with some advantage. Active friction to the chest, with the use of mild mercurial agents, both outwardly and inwardly, may be properly applied. Rowels are also useful, but when in use, the horse should be liberally supported by the most nutritive food. In case these plans of treatment should all of them fail, it will be prudent to perform the operation of *paracentesis*, or tapping the chest, which, although I have never succeeded in myself, I have known to be fully successful in the practice of another; and since understand it has proved equally fortunate with a few other veterinarians. It should however be borne in mind, that the more early in the disease the operation is performed, the greater is the chance of success.

The *mode of operating.*—The situation most eligible for the opening, is that wherein a depending orifice may be gained for the complete evacuation of the water, without danger of wounding important parts by the puncture. If it be carried too low, the mediastinal folds, or even the pericardium, may be endangered; but in either of the costal openings, between the seventh and tenth ribs, nearly as low as their termination into cartilage (see *pl. of Skeleton*), an opening may be first made by a scalpel towards the anterior edge of the rib, to avoid wounding the intercostal vessels (vid. p. 160), first drawing the skin a little forwards or backwards, to ensure a future closing to the access of external air. By means of this integumental opening, carefully introduce a long and large trochar, unless the dissection with the scalpel be carried quite through both integuments, muscles, and pleura at first; in which case, a canula only is necessary. But if the trochar be used, which is the safer plan, direct it through the opening in the skin, over the posterior rib, rather slanting, upwards and backwards. If the hydrothorax be very fully formed, that is, if one or both cavities be nearly filled with serosity, less caution is necessary in the introduction of the trochar: but if the operation be performed more early in the complaint, which there is reason to think it should be, to insure success, then it is necessary to proceed more cautiously, to avoid puncturing the lungs. Having introduced the trochar only so far as to observe a gush of fluid, push the canula forward, retracting the trochar itself. After which fasten the canula around the horse, to prevent displacement. If both thoracic cavities be thus affected, proceed in the same manner with the other side. Coagula, or even the inflated lung, sometimes is found to obstruct the flowing of the latter portions of fluid; to obviate which, a bougie or piece of whalebone may be occasionally introduced up the canula. When the whole of the fluid has been withdrawn, remove the canula, and close the orifice by adhesive plaister and bandage; as it will be better to operate a second time than to admit air within the thoracic cavity; for although the same fears are not now entertained as formerly on this head, yet inflammation is apt to supervene, or external air gain admission between the lungs and its pleura.

When matter forms within the chest, its removal may be also effected in the same manner.

HYDROPS PERICARDII.

Carditis, or inflammation of the heart, is apt to terminate by an inordinate effusion of serum within the membranous sac, called pericardium. It is likewise occasionally consequent on pneumonia. If it admit not of a natural cure, or of one promoted by the remedial plans detailed for hydrothorax, no mechanical means of abstracting the fluid presents itself.

DROPSY OF THE BELLY.

Ascites.] [Ascite.

This is a very unusual disease in the horse; now and then, however, it does take place after inflammation of some of the abdominal viscera. It consists of an increased deposit of interstitial fluid within the cavity of the peritoneal sac, being seldom encysted in the horse.

It is known by the tension of the abdomen, and by the undulation felt by one hand when the belly is gently struck with the other. The urine is made in small quantities, the thirst is great, the breathing is quick and laborious, and the flesh wastes.

It may arise from an increased action of the exhalents, or from a deficient one of the absorbents, by previous inflammation, or by chronic disease of the liver. Hydatids may also bring it on, in which case it would be encysted.

The *Treatment.*--In these cases it would be fortunate if we could ascertain whether the absorbents or the exhalents were in fault at the origin of the complaint. To promote the *Cure*, however, in either case, we must stimulate the arteries to throw out their superabundant fluid by other emunctories, as the bowels and kidneys: diuretics are therefore principally to be resorted to; and the more so, as in the horse we have greater power over these glands than in the human. Strong purges likewise promote a serous discharge, but, from their weakening effect, cannot be very often repeated. The absorbents may also be stimulated by mercury, or other means known to have the effect of acting on them, as nauseants, &c. As a last, or indeed as an early and the most prudent resource, paracentesis, or tapping, may be resorted to. The mode of operating in these cases will not differ in any essential particular from that described for hydrothorax. The spot chosen for the opening should be one that will avoid wounding the stomach, the liver, or the epigastric or other vessels; and the most eligible for this purpose in the horse, is the middle line between the umbilicus or navel, and the sheath. In the mare, any portion of the linea alba between the umbilicus and pubes, that is, any part of the median line of the belly situated between the bag and navel, is proper. In whatever way recovery is promoted, the recurrence should be prevented by strengthening the general habit.

CLASS VIII.

DISEASED COLLECTIONS OF FLUID WITHIN THE CELLULAR MEMBRANE.

DROPSY OF THE SKIN.

Anasarca.] [Œdême.

THIS is variously called by farriers. It does not materially differ from ascites, either in cause, effect, or cure; but is very different in its seat, being generally, or partially, diffused through the cellular membrane of the skin. When it is partial, it usually occupies the legs, the sheath, or the lips: when general, every superficial part of the body becomes affected. It sometimes is joined with farcy, but is then purely symptomatic. If it occasion troublesome ulcers, it then bears the name of *water farcy*, which, however, is a very indefinite term, as œdema, from whatever cause, is apt to be called by farriers water farcy, when no farcy is present. Anasarca is particularly characterised by the indentations of the skin remaining, when the pressure occasioning them is removed.

It may be brought on by all the causes of ascites, and is frequent in spring and fall, when horses are weak from moulting. When partial, it is not difficult of cure; when general, it is more obstinate. Diffused inflammatory affections, and important local ones, terminate sometimes in general œdema; and which cases are very frequently fatal. I have more than once successfully evacuated these œdematous swellings by small punctures with a lancet, following up the treatment with tonics.

Cure.—Feed nutritiously, and use similar means as in ascites or dropsy of the belly; to which add vigorous rubbing of all parts of the body, and considerable walking exercise. Alteratives and mild diuretics should be tried; but if the horse be in a weakened state from any previous affection, feed liberally with malt, carrots, or speared corn. Give bitter tonics, with sulphat of iron or copper, &c. &c.—See *Condition;* see also *Mat. Med.*

SWELLED LEGS.

Anasarca.] [Enflure des Jambes.

THIS is a most common disease, affecting sometimes the fore legs, sometimes the hinder, and sometimes both; but nine times out of ten, when it attacks the one of these only, it is the hinder. Swelled legs may be occasioned by various causes, as injuries producing tumour, or inflammation occasioning phlegmon; but the enlargements we here allude to, arise from local anasarca, occasioned by a deposit of fluid within the cellular membrane of the limbs, commonly of their lower parts. When long continued, the distention so weakens the skin as to force it to yield in the form of cracks, from which the serum first exudes; gradually, however, the whole of the secreting capillaries of these parts inflame, and then throw out pus, and the disease becomes what is called grease.

Causes.—This complaint always originates in weakness; but this may be general over the whole system, or confined to the legs only, in consequence of the increased strength and action of some parts over-balancing that of others. That debility, local or general, is the cause, we know, by the phenomena occasioned. At the close of long continued diseases that weaken much, the legs always swell; and it is reasonable to expect they should do so, when we consider how far they are removed from the source of circulation, the heart; added to which, the fluids in them have to move in a direction perpendicularly against their own gravity; the veins therefore finding a difficulty in propelling their contents, appear to excite the secreting capillaries to an increased deposit within the cellular membrane. The absorbents may also be affected, but it is more than probable they are the least part of the cause, for we find them, in these cases, equal to taking up the fluids on the increase of stimulus; that is, a little exercise soon removes the whole swelling. Sudden changes in the temperature of the atmosphere that horses are used to, or in the degree of clothing they wear, or hasty alterations in the nature of their food, may occasion swelled legs; and which may occur either by these causes diminishing the means that keep up life, and hence producing a *general* debility, or, they may act by adding to the means that promote life, by which a general plethora may ensue, still equally productive of a *partial* debility: for the balance of power being unequal here, the legs cannot resist the pressure on them, and swellings appear. Thus it is, that when horses removed from grass, or from a straw yard, are brought at once into a hot stable, and fed highly, their extremities swell immediately; for the powers of life are unduly pushed before the parts have taken on a capacity for this increased action. Therefore arises a necessity for bleeding and physicking in these cases, but which are found to be less necessary when this alteration is gradually brought on. Standing in the stable, with a full allowance of food, and little exertion, acts in the same way, and from the same cause. Hence exercise is doubly useful, by promoting other excretions, and by the increased action it excites in the absorbents. On the contrary, turning horses out to a straw yard from full feeding, warm clothing, and a hot stable, may likewise bring on swelled legs, by occasioning a general debility: but so much do horses improve as they approximate a state of nature, that though this is an equal change with that of removing them hastily into stables, yet they comparatively seldom suffer from this treatment.

Standing in snow, or in cold water, produces swelled legs, by weakening the parts, and by being unfavourable to absorption. It is very usual also for horses to have œdematous extremities in autumn, at which period the powers of life are unequal; there being an increased action in the skin to produce new hair rapidly, and those parts most remote from the seat of circulation are consequently unequally supplied with vital energy.

Cure.—This will not be difficult, when we make ourselves master of the cause. In removing horses from grass to the stable, with the precautions mentioned, it may be prevented: but when it has occurred, it must be combated, in plethoric full horses, by lessening the general action of the vascular system at large, at the same time increasing the individual strength and tone of the affected parts in particular. For this purpose, bleed; reduce the diet, if too full; give bran mashes and alteratives, with three or four hours walking exercise every day. Intervene between the alteratives one or two doses of active physic; and, if the swelling prove very obstinate, insert a rowel in each thigh to alter the action: in general cases, however, these are unnecessary. But when swelled legs occur in a horse that is thin and impoverished, the general debility must be counteracted to promote a cure, by feeding liberally, and by giving mild diuretics, united with tonics, as prescribed in ventral dropsy. Purging in this case, though it may lessen the swelling *momentarily,* by carrying off the watery parts of the blood, yet it will probably increase the enlargement *finally,* by further weakening the system in general. Apply friction to the legs; use gentle exercise, but not to produce exhaustion. The weakened vessels having been long distended, will perhaps not readily regain their tone; they may therefore, in this case, be assisted by bandages moistened in astringent solutions. When it occurs among cart horses, haybands may be used for this purpose, dipped in cold water, in which some grooms and carters are very expert. In other instances, strong woollen of any kind may be made use of; but flannel forms the best bandage, when evenly and firmly applied, by means of a roller of three yards in length and four inches in breadth. Occasionally we meet with cases wherein the legs appear to become habitually enlarged, or where the recurrence of the swelling is so frequent as to occasion continual trouble; in these a permanent bandage is best, produced by firing, and which, in this case, should be done in nearly perpendicular lines; for, by corrugating the skin, and in some measure lessening its elasticity, it becomes itself a bandage to the weakened vessels; but if the firing be done in any other than a perpendicular, or nearly a perpendicular direction, the effect is in a great measure lost. See this subject farther pursued in *Grease;* see also *Condition.*

CLASS IX.

CALCULAR CONCRETIONS.

THE horizontal situation of the abdomen, but more particularly the manner of feeding, with the nature of his food, renders the horse particularly liable to concretions within his intestines; no animal with which we are acquainted being so subject to them. The nature of these intestinal concretes varies extremely in composition, form, and size. Most of them are, however, composed of sabulous matter, which first collecting around some accidental nucleus as a nail, small stone, &c. &c., increases in concentric lamellæ, each strata differing in colour as the various ingesta yield matters of various deposit, or as the state of the alimentary canal forms various chemical decompositions. Some are so dense and compact, as to bear a polish; while others are more soft and friable. In some instances they appear principally composed of inspissated mucus, mixed with indigestible matter, agglutinated into a hardened mass or masses, taking on the shape of the dung, from their lodgment in the sacculi of the colon, or other large intestines*. Hair balls (*tophus bovinus*) are rarely found in the horse. I have seen calcular masses of enormous sizes and weights: in some instances numbers of lesser ones exist; in others, one, two, or more of considerable magnitude have been found with sides adapted to each other, by which it would appear, that, notwithstanding the peristaltic motion, they were principally in a state of comparative rest. Many horses appear to suffer little from them, while in others they beget occasional spasm, and finally by displacement they bring on fatal strangulation, constipation, or inflammation; in each of which ways, I have known them to destroy horses. The frequency of occurrence of intestinal calculi cannot surprise us, when we consider the habits of some horses, which leads them to eat roots, and even the earth itself; while those most carefully fed, must still meet with much silex in the matter and manner of their feeding†.

The *cure* is out of our power, and the prevention is little less so, from the universality of sabulous matter around the animal.

STONE IN THE KIDNEYS.

Sometimes, though very seldom, stones form within the cavity of the pelvis of one of the kidneys. In the human these do not often remain long, but, by their gravity, fall into the bladder; in the horse they accumulate, till they fill the cavity of its pelvis. The kidney does not appear to suffer much at first, but continues to secrete for some time. In the end, however, more active symptoms arise, and the irritation kills.

It can only be removed in the early stage by diuretic medicines, which might relax the passages, and wash away the concretion while small.

STONE IN THE BLADDER.

Though this also is not frequent in the horse, it occurs oftener than the former. I have seen several urinary calculi taken from horses after death. Mr. Clark, of Edinburgh, informs us he has several which had been taken out of different horses. Dr. Mead had one in his cabinet that weighed eleven ounces. The symptoms are an irregular flow of urine, with sudden stoppage of it, and occasional spasmo-

* The blind pouch of the cæcum is a very common situation for them, where, unexposed to the peristaltic motion, they remain secure and accumulate.

† Mr. Rickwood, *Veterinary Surgeon*, of Bedford, has given the public some judicious remarks on these concretions, which he supposes prove more frequently fatal than is supposed. He observes, they are particularly common among millers' horses, which he attributes to their feeding principally on bran and split-beans. He thinks, that the soft nature of the stones used in the splitting of these beans affords so much gritty matter, that it is likely some must become concreted, from the mucilaginous nature of the bran. The practice of watering their horses at the mill tail may also assist in this, where a large quantity of earthy matter must necessarily be put into motion.

dic pains. The presence of a stone may be detected by examining the bladder by means of the rectum, and its removal may be effected in the same manner as is practised from the human bladder; that is, an opening must be made from the membranous angle of the perinæum, sufficiently large to admit a forceps to extract the stone with.—See *Inflamed Bladder*.

CLASS X.

MORBID POISONS.

HYDROPHOBIA.

Rabies.] [La Rage.

THE rabid malady seldom occurs in horses, and when it does, it arises from the bite or contact of morbid saliva, produced by some rabid animal, either of the canine or feline species: more frequently from that of a dog.

The *Symptoms* in a horse are various; it usually, however, commences by great apparent distress, and sudden breaking out into profuse sweats; at length he becomes completely unruly, he stamps and paws violently, and attempts to disengage himself from his halter. Though *madness* be a complete misnomer in the dog, it is by no means so in the horse; for within twelve hours from the attack he usually becomes frantic: and I have seen one, level with the ground the whole of the internal fitting up of a six-stall stable, himself sweating, snorting, and foaming amidst the ruins. The disease follows the inoculation, or bite, at the same periods as in other animals; that is, from five weeks to three months: but I have observed, as in dogs, its attack is always quicker when the bite is received in the head. On examination of the morbid appearances after death, in two cases, there were great inflammatory marks in the lungs; the stomach and bowels also participated in the affection. The meninges of the brain were likewise suffused with blood.

Treatment.—Our efforts must be principally directed to a *preventive* plan; for nothing we yet know of will arrest the disease when it has actually appeared. When a bite has been received, immediately dissect out the wounded part, or, if only superficial, apply a caustic to it: but when deep or much lacerated, dissect the part carefully out, and afterwards apply the caustic. When this is properly done, no fear need be entertained for the safety of the animal: but it is very difficult often to decide that no *other* bite has been received. Under such circumstances, any antidote at all, possessing but questionable efficacy, should be also given. I have, from innumerable trials, a great dependence on the efficacy of the *buccus* or box; the virtues of which are fully detained in the CANINE PATHOLOGY. I would therefore advise the administering of the following:—

Box leaves (if possible, the tree box) ...... eight ounces
Rue .... eight ounces,

Cut very fine, and boil in three pints of milk in a close vessel for one hour; then remove and strain off. Again, boil the ingredients another hour in three pints of water. Again, strain off, and mix the liquors. Give a third of the mixture every morning fasting. A *cow* may take the same quantity, and a *sheep* one third of it.

Mr. Youatt, Veterinary Surgeon, of Nassau Street, Middlesex Hospital, London, with whom I was for many years in connection, places, however, more dependence on some preparation of his own. The known integrity and extensive research of this gentleman render his preparation worthy of confidence and trial.

THE BITE OF VENEMOUS REPTILES.

Many of these, in warmer climates, inflict fatal wounds both on man and beast. In the East Indies, the cobra di capello will occasion death in the largest animal in a few minutes: fortunately we have none of the serpent tribe whose bite or sting is poisonous but the adder; which now and then wounds horses and oxen while grazing, and sometimes dogs in hunting. This accident is not very frequently of much consequence; and country persons, in these cases, merely rub the part with an onion, and force another, mashed, down the throat, which may not be injudicious. In more serious cases the following will give relief:—To a horse, ox, or cow.

Spirit of hartshorn *(liquor of carbonated ammonia)*	one ounce
Olive oil	a pint.

Mix, and give.

To a sheep or dog, a third of this quantity may be administered, and the wounded part may be likewise bathed with oil of turpentine. In case the above cannot be procured, the same quantity of oil of turpentine internally may be substituted for a horse; or a large glass of brandy with half a pint of melted butter; or gin and melted butter, of each half a pint. The stings of hornets, wasps, and bees, may be successfully washed with vinegar, or rubbed with the blue (indigo) used by washers, which is often found to be an instant specific.

VEGETABLE POISONS.

The stomach of the horse is sensible to the deleterious effects of many, indeed of most of the narcotic and acrid stimulating vegetable matters, which prove destructive to the human. Of some of these, however, it takes an immoderate dose to seriously disturb the functions; of which opium is an instance among others: while a moderate dose of the prussic acid in the form of lauro cerasus kills him in a short time. The taxus baccata, or yew tree, is very poisonous to horses, stealing away life speedily, without raising convulsion or commotion. Digitalis purpurea, or foxglove; œnanthe crocata, or dropwort; phellandrium aquaticum, or water parsly; conium maculatum, or hemlock; cicuta viroso, or water hemlock; nicotiana, or tobacco; are all poisonous likewise to horses. Vegetable narcotics appear to produce their effect through the medium of the stomach on the sensorium. Drastics inflame the villi of the stomach and bowels, as do also the more acrid stimulants. After death from narcotic poisons, the stomach often bears but little marks of affection, nor are more to be found in the head; the lungs are, however, found in many cases very highly inflamed. The more acrid vegetables leave very powerful marks of their ravages, by deep inflammatory spots over the villous surfaces of the stomach and intestines.

We cannot hope to effect the removal of poison by vomits in the horse; but we may do it in the cow, sheep, or dog, by considerable doses of emetic tartar, or of white vitriol. We must therefore, in the horse, counteract the effects by a liberal use of acids and demulcents, as oil, butter, &c.: but in such cases a caution is necessary with regard to vinegar, which in doses of a pint has destroyed; half a pint may, however, in urgent cases, be safely given, or a dram of oil of vitriol *(sulphuric acid)* may be infused in a pint of water, and poured down: if it can be procured, the stomach pump should supersede every other means.

MINERAL POISONS.

These act usually by their caustic quality on the coats of the stomach and bowels; but the horse is an animal whose powers of resisting the effects of the more active mineral agents is remarkable: much of which capability is unquestionably dependent on so great a portion of his stomach being insensible. But there must be an inherent structural power in the other parts of the alimentary canal also, to resist their effects, or otherwise how comes it that the caustic mineral acids do not, when they have passed the cuticular portion of the stomach, which they naturally do in common with other matter; how comes it that they do not then exert their baneful influence, except in quantities which bear no proportion to the mere bulk, or the general powers of the animal, compared either with man or other animals? Tartarised antimony *(emetic tartar)*, to the amount of four ounces, creates little disturbance in the horse, and proportionate doses of its sulphuret *(crude antimony)* and oxyde *(antimonial powder)* are equally innocuous*. The acetate of lead can also be borne by the horse without disturbance in very large quantities: and although arsenic and the oxymuriate of quicksilver *(corrosive sublimate)*, the acetate of copper *(verdigris)*, cannot be borne in any thing like equal doses; yet quantities that would astonish the inexperienced, are given every day medicinally.

The *Symptoms* which arise from the imprudent† or malicious ad-

* It has been erroneously argued, that because a horse can bear this quantity of antimony, that therefore in moderate doses it must be inert. Analogy teaches us that repeated small doses of many articles effect that which one large dose cannot do; and fact fully evinces that the power of antimony in lessening vascular action is considerable.

† By the term imprudent, I mean the continued administration of even moderate doses, without carefully watching their effects, and of occasional cessations from the administrations of them: for it is remarkable, that a horse will continue to take 30 or 40 grains daily of the most potent of these, without apparent ill effect. All at once, however, symptoms arise, and consequences ensue, as though the united quantities he has taken had been given at once.—(See *Treatment of Farcy*). In these cases a loathing of food is a precursory symptom, perhaps for a day or two, which if attended to may save the animal, by preventing the repetition of the hurtful agent.

ministration of the more commonly used mineral acids, do not materially differ. The horse is first observed uneasy and shifting his position, which ends in his lying down and rolling, or stamping with his feet, as in gripes: he also looks round at his sides, in the same manner; so that these cases might be readily mistaken for colic, were it not for an appearance which is almost constant here, and is very rarely seen in spasmodic colic. This is the presence of a viscid, ropy, or frothy mucus, which continually distils from the mouth, which is singularly hot and often fœtid to the smell. In some instances there are frequent attempts to stale and dung: now and then fœtid bloody evacuations pass. Profuse cold sweats break out, the weakness becomes extreme; the pulse, from the first quick and small, now intermits, and he sinks to rise no more.

Dissections of these cases, as far as my limited means of observation enable me to judge, do not always present appearances commensurate with the violence of the symptoms. In some cases, the whole alimentary canal will present gangrenous and sphacelated portions of great extent, when the sufferings were not apparently intense, and where even hopes were entertained of amendment. In others, spots of an inflammatory hue are dispersed over the villous surfaces of the stomach and intestines, at considerable distances from each other, and yet the sufferings during the disease were extreme; but strong marks of structural derangement are, however, present in every case.

The *Treatment* is very seldom fortunate, from the difficulty of ascertaining the nature of the disease, and the time usually lost before assistance is sought for. If an early application be made, and a stomach pump can be made or procured, it ought to be at once employed: but under other circumstances, our efforts should be first directed to dilute the poisonous matter, and then to weaken its potency. Alkalies have been supposed the best means to fulfil the second intention, as an ounce of potash in thin gruel. Orfila, however, recommends in these cases, particularly such as arise from corrosive sublimate, entangling the poisonous matter in the albuminous (i. e. the white) matter of eggs. Back rake, clyster largely, and otherwise act as the symptoms direct.

LOCAL INFAMMATION.

The *principles and doctrine of inflammation* have been so fully treated on at the commencement of the Pathology, under the head *General Inflammation*, that we shall only introduce the practical inferences to be drawn therefrom; with such particular observations as immediately connect it with the surgical part of our subject. A very attentive consideration of these principles is necessary to a successful practice of horse surgery, as many, nay most of the local and external diseases of the animal, have their foundation in inflammation.

Local inflammation is characterised by heat, by redness, by tension or swelling, and by pain or tenderness in the part affected. According as such inflammation is violent or mild, or according to the structure or functions of the inflamed part, so the circulation in general participates, or it does not participate in the affection. When the general circulation is increased, the horse is said to have *symptomatic fever,* but in every instance the vessels of the inflamed part are in a state of distention*; the effects and terminations of which are various according to the nature of the part, the state of the patient, and the violence of the attack.

If the inflamed vessels be enabled to reinstate themselves by getting rid of the distending column of blood within them, and of recovering their tone and contractility, *resolution* takes place. But when this does not occur, the same vessels pour forth the coagulable part of the serum, which still further increases the tension already occasioned by the distended vessels. In *wounded surfaces,* this adhesive matter thus poured forth is the very pabulum for the new formed parts, and the cement by which the breaches are to be repaired. This inflammatory effect is called *adhesion.* If the morbid attack be still more active, or longer protracted, or if extensive injury have been done to the surrounding parts by pressure, laceration, &c. then the same vessels, instead of the albuminous part of the blood, secrete from it a homogeneous fluid called *pus* or matter, with which process ulceration or lymphatic agency in the removal of surrounding edges is united. This state is called *suppuration.* Occasions will, however, occur when the inflammatory action is very violent, or when it is very long protracted, or when it occurs in a constitution generally debilitated, or when a part has suffered great accidental violence; in any of which states, the inflammatory congestion may rupture the vessels, and destroy them; and the effused blood will putrefy in and around them, when *sphacelus, gangrene,* or *mortification,* is said to have come on.

The *treatment of local inflammation* must be varied according as the tendency to these different kinds of termination exists; but when it is in our power, there are but few instances in which we should not choose the termination by *resolution.* The first indication to produce which, is to restore and equalise the balance of power between the parts; and this must be done either by bringing the system at large down to the level of the affected parts, or to raise the tone of the inflamed parts to the level of the system. The former is only to be attempted when the general plethora is very great; in which case we make use of general bleeding, purges, and diuretics (see *Diffused Inflammation).* In most instances, however, topical bleeding is to be preferred, where it can be practised, by which the distended vessels are at once freed from their load. When blood cannot be drawn from the immediate part, still it is often practicable to open a vein in the neighbourhood of it, and which returns the blood from that individual part immediately. In violent local inflammations, both topical and general bleeding may be usefully employed at the same time.

* It seems doubtful whether an inflamed part is always in a state of increased strength. On the contrary, it may, under some circumstances, be considered as in a state of increased debility; for the inflammatory action, particularly of the larger arterial trunks, has carried the distention of the capillary branches beyond their contractile power to overcome; and debility appears to be the natural consequence of long continued or inordinate distention. This view of the matter is a very important one in practice, and deserves the most attentive examination and consideration.

Topical applications are among our most active agents in local inflammations. In phlegmonous inflammations particularly, cold is a most active agent in promoting resolution, and also in the inflammatory actions which follow those injuries known by the name of strains. With the coldest water mix the acetate of lead (see *Vet. Pharm.*), and renew the application frequently in the wettest state, by which means constant evaporation will increase the cold. Or a still colder application may be formed from the muriate of ammonia with vinegar (see *Vet. Pharm.*); and when a discutient application is required from the effects of outward injury, this is the preferable application*. As cold proves itself an active agent in local inflammations, so also heat, or rather warmth, in many other cases, proves no less so. It is in vain to theorize on the seeming incongruity of curing the same disease by two such opposites: the facts are so, and all the theoretic arguments in the world cannot overturn them. In many cases, therefore, we reap the most decided advantages from the use of warmth in the form of poultices or fomentations, which appear to act by unloading the vessels of the part in the form of sweat or exhalation: but as actual heat increases inflammatory action, and therefore promotes other termination than resolution, we should be careful to avoid applying either of these means too hot. On the other hand, as in these immediate instances, cold would prove injurious; so we should be careful in the use of fomentations, that we do not leave the part afterwards wet and exposed, otherwise cold will be generated by evaporation (see *Poultices and Embrocations, Vet. Pharm.*) For these reasons a moderately warm poultice frequently applied becomes, in many cases, one of the best applications in promoting resolution, and perhaps it is peculiarly eligible when the inflammation is some way removed from the surface, as it tends to unload the vessels near the part, without at all adding to their increase of temperature. When the inflammation is situated still deeper, we frequently use rubefacients or actual blisters, which create an artificial metastasis (see *General Inflammation and Blisters*). But when, notwithstanding all our efforts, the tension, heat, and tenderness of the part increases, suppuration will take place.

When *suppuration* becomes unavoidable, it is then our duty no longer to attempt to retard, but on the contrary we should promote it, to prevent the worse termination (by a continued irritation and debility) into gangrene. If the inflammation have been confined to a mucous surface, we may expect the transition to take place without trouble, these surfaces changing their secretions from a mucous into

* Mr. Percevall recommends the application of ice to inflamed surfaces; but there can be few cases in which such practice ought to be employed, except with extreme caution; for extreme cold immediately applied to an inflamed surface reduces the temperature so quickly, as frequently to destroy the life of the part and to produce gangrene. I am also at variance with Mr. Percevall on the subject of lead as a valuable agent in lessening inflammation in the horse; and his proof to the contrary is not in the same scale with his usual reasoning. Mr. Percevall states that lead is inert as an external application, because even in ounce doses, taken into the alimentary canal, it is perfectly innocuous. In grain doses it is hurtful to the human alimentary canal, and yet the external parts may be soaked with it to the greatest advantage, for weeks together, and surely the one argument is as good as the other; while the latter fact is a full antidote to the rationale drawn from the former.

a puriform fluid, without great increase of effort. If the inflammation be situated on the skin, or if it belong to muscular fibre, or more particularly if it be such as engenders abscess, greater changes will be observed (see *Tumours*). The heat and pain will lessen, but the actual sensibility of the part will often be augmented. It must be our care now to avoid depleting the system; a moderate warmth should be constantly applied to the part, by means of warm poultices. Should the suppuration be deep seated, or when it becomes prudent to hasten the maturation, solid turpentine may be added to the poultices, and which poultices should be frequently renewed. Fomentations might possibly, if persisted in and often renewed, be better, as renewing the heat oftener; but in these cases the part must not be suffered to cool, nor be left wet, otherwise evaporation will do more injury than the fomentation does good. When neither poultices nor fomentations can be used, the part should still be kept warm, by means of an adhesive plaster over it, or with cloths; or it may be thickly greased over, which promotes heat, and prevents the effects of evaporation. In this state it is still to be remembered, that if the general action of the system should be very inordinate, it is to be repressed; or the inflamed parts may, instead of falling into a healthy suppuration, be hurried in the end to such debility as will produce an entire loss of their tone, when mortification must ensue. When suppuration has been long continued, sometimes the vessels become so habituated to the action, that it is not easy to promote a healing process: in this case setons and rowels are introduced, to promote a new action.

Mortification.—When the congestion in the capillaries is extreme, or when debility to a great degree takes place in a part under inflammation, it falls into mortification. If the adjacent parts likewise are equally debile, they frequently participate, and become gangrenous also; but if they are strong, the absorbents are equal to the removal of the edges of the sound part, and by this means a separation of the dead from the living takes place. It is, therefore, our duty to prevent this extension of death to the sound parts, and to promote the removal of the dead from the living. To effect this we must attend to the system generally, as much as to the parts individually, for upon a salutary effort of the constitution at large are we principally to hope for this; particularly when the inflammation is extensive, or deep seated. Constitutional remedies are peculiarly available, because the immediate parts are already dead, and no topical applications can restore them. The *constitutional* means are such as tend to moderate arterial action, if it yet remain inordinate, without producing debility or exhaustion. These ends are best fulfilled by nitrous or vitriolic æther; and the liquor ammoniæ acetatis (*Med. Pharm.*). If the debility be already extreme, we must employ more active tonics, as bark, opium, camphor, &c., with malt, ale, and gruel, as beverages. With regard to medicinal tonics and cordials, they should be administered in small quantities, but frequently, that their action may be uniform and permanent, and at the same time not inordinate. Local applications are to be made use of also, not with a view to restore the parts already dead, but to prevent the spreading of the evil, and to assist the separation of the sound from the unsound. The fermenting poultice is a useful application (see *Poultices*); and occasionally the parts may be washed with the muriate of ammonia and vinegar. Scarifications are not to be recommended, for they only reduce the living parts into the same state as the dead ones.

We shall proceed to apply these doctrines to a consideration of the several subjects of *wounds, ulcers, tumours,* inflammatory, indurated, and encysted, and to that inflammation, both healthy and diseased, which affects the bones.

CLASS XI.

WOUNDS.

A WOUND is a solution of continuity, or a division of some of the parts of the body; and as wounds frequently occur to all the animals domesticated to our use, it becomes a matter of great importance for the veterinarian to be equal to the treatment of them. The surgical treatment of wounds differs in the horse from the human, from peculiarities in the constitution; but principally it differs in the *mechanical* parts of the treatment: therefore *veterinary* surgery cannot be perfectly learned from the most intimate acquaintance with the practice of *human* surgery.

A wound in the horse should be treated according to the particular circumstances which take place, as the nature of the wound, the part in which it happens, as well as the immediate structure of the substance divided, and the constitution and habits of the animal. When a wound occurs, it undergoes several states before the part is again made whole: hemorrhage first takes place, which if very considerable must be immediately attended to. It is, however, to be remembered, that the vital resources are so much greater in the horse, that the division of an artery which in the human would require pressure to stop the flow, in the horse may be allowed to remain unattended to; and that when nothing but taking up a human artery can secure life, moderate pressure will be sufficient in veterinary practice. When, however, a very large artery is divided, it should be secured with a tenaculum, if possible; or if not practicable by these means, a ligature should be passed around it of fine strong silk (see *Wounds of the Arteries*). The next circumstance to attend to, is the removal of any extraneous matter which may have insinuated itself; and if this can be done without washing the cavity, the chances of early union will be increased. But when dirt, dust, &c. render washing out the wound absolutely necessary, tepid water is all that is requisite. All stimulating applications, unless to a contused wound, are worse than useless, and promote an unhealthy after inflammation. It has been already stated that in ordinary wounds it is prudent to attempt what has been called union by the first intention, which modern surgery defines to be a state brought about by the vessels of each side of the wound inosculating with each other. Each tubular opening having poured out its adhesive coagula, hastens to prolong itself through the extravasated matter by an effort of its own vitality, the adhesive fluid gluing the surfaces, as the inosculating vessels interlace and dovetail the union. Some veterinarians deny that this union ever takes place in the horse; but which is certainly erroneous. I have seen many instances to the contrary; and although the force of the arterial circulation in the horse usually hurries on the suppurative process, yet it is more owing to the difficulty arising from his restlessness, than to any speciality, that it does not more frequently happen. It is, therefore, the duty of every veterinary practitioner to endeavour to promote the adhesive union by a perfect adaptation of the sides of the wound together, and by a careful retention of them in this situation. In any wound beyond the most superficial, the only safe means of doing this is by sutures.

Sutures are stitches made in a wound with needles armed with either silk, cotton, thread, worsted, or fine tape; and which arming is usually many times doubled, that it may not cut the parts: it is also waxed to increase its tenacity. There used to be many kinds of sutures, but modern surgery has reduced the number to three; at least, the interrupted, the twisted, and the glovers, are those principally in use; of which the first is by much the most useful and general in its application. The *interrupted* suture is nothing more than an indefinite number of distinct stitches, unconnected by the threads with which they are made. For deep wounds, and for such where the substance of the integuments is to be brought into union, the needles used are curved, with their substance somewhat flattened, which form best adapts itself to the penetrating of the substance of the divided edges of such wounds *; the lips of which having been cleansed from clots of blood, or any extraneous matter, should be carefully brought together in exact opposition. The needle properly armed, is now to be carried from without, inwards, to a sufficient depth to prevent the ligature tearing away the flesh. Having penetrated the one lip, carry the needle through the other, from within outward. Cut it away from its ligature, which leave untied; again thread or arm it, and if more stitches be required, repeat the operation in the same manner for each stitch, the distances of which from each other must be regulated by circumstances, as the depth of the wound, its being exposed to much or little motion, &c. I have seldom, in wounds of the integuments, found it advisable to put them nearer than an inch to each other; but oftener I have allowed an inch and a half or two inches between each. Having inserted as many stitches as are requisite to sustain the parts in their just position, begin to tie each ligature, an assistant carefully holding the edges of the wound together; bearing in mind that, if the wound be considerable, it is prudent to fasten the centre stitches first. The disposition that is observed to ulceration in the horse and other quadrupeds, greatly lessens the advantages which are often derived from sutures in the human subject. It is very seldom that the veterinarian can depend on any suture remaining beyond the third or fourth day, after which it ulcerates out.

* The prudent veterinarian will furnish himself with these needles of various sizes, degrees of curvature, &c.; and which he will find in sufficient variety at Mr. Long's, High Holborn, who has made some important improvements on them lately.

It is therefore of great importance, that he possesses himself, in these cases, of the assistance of adhesive plaister made of resin, pitch, or cobbler's wax, and spread on leather, strips of which should be passed across the edges of the wound (which, if possible, should be previously shaved or shorn), of sufficient extent to reach beyond the exuding moisture. It is also of equal consequence, that the whole be secured by a proper bandage. Wherever the uniformity of the part, as in the limbs, will allow it, the bandage in human surgery, called the *uniting*, is the best, which consists of a long roller having two heads or rolls, by which means the central part can be first applied to the portion of limb opposite to the wound; by then drawing each roll forward, the divided edges are brought into contact by the pressure, and the completion of the bandage will retain them there. The conical form of some parts of the extremities will in some measure prevent the permanent application of any bandage, unless retained in its situation by supporting ends passed in the fore legs over the shoulders and over the loins for the hinder. This form of suture is applicable to most wonnds, and is even now practised on the intestines in lieu of the glovers suture, which having been thought to pucker the wound and increase the inflammation, has been brought into disrepute. (See *Wounds of the Intestines.*)—The *twisted suture*, though popular in human surgery, is not frequently applicable to the horse. I have however occasionally used it; and I think that in wounds of the eyelids, lips, nostrils, &c., it may in some cases be advantageously employed*.—The *glovers* suture, as before observed, is in disrepute; and though still used by many older surgeons, is certainly superseded by the interrupted, which, it has been found, is fully equal to producing adhesion in the intestines and other thin membranous cavities. All straight surgical needles are made with a triangular cutting edge, which greatly assists their entrance into the substance of a wound, particularly of membranous parts.

It remains, however, on the subject of sutures in general, to remark that it is questionable whether their use might not more often be dispensed with, and whether the irritation occasioned by the ligature does not more often retard than promote the adhesive union: it is principally as a promoter of this union, that they are advisable; for, as before remarked, it is very seldom that the ulcerative process allows them to remain beyond the third, fourth, or fifth day at the utmost. It is likewise not unusual for the irritation of the wound to occasion the horse to rub or bite them out before even this time, unless both horse and wound be very carefully secured. It is also necessary to remark that in some cases, particularly where any foreign body has been incautiously allowed to remain within a wound, the irritation becomes so great, that it is prudent to divide the stitches, which will sometimes give immediate relief: and the same occurs often when the mere inflammation of the part runs high.

The *adhesive inflammation* may, however, and certainly does in

* When I was in Holland, acting as surgeon to the 40th Regiment of foot, I was requested by a field officer to look at a valuable charger which had the right nostril divided by a sabre wound, and which had penetrated through the lip into the mouth. I conceived the project of retaining these parts in their situation by means of needles, which I supposed, as being thin, were not so likely to ulcerate out; and the event justified my view of the matter.

some cases, appear to be promoted by the judicious use of sutures: and as in all wounds it is our duty to attempt the present or future union, by a close opposition of the divided parts; so we must be guided by circumstances as to the best method of retaining them so applied, until structural union binds them indissolubly. The adhesive union will be also greatly promoted by moderating the inflammatory tendency which may be expected to arise from an extensive wound by general bleeding, low diet, cool temperature, &c.: but it is proper to remark, that, until this union be despaired of, no moist applications should be applied.

Suppurative process.—When, however, circumstances prevent this early and desirable union, a more considerable inflammatory action necessarily arises, in which, if the wound be very extensive, the constitution partakes and produces symptomatic fever. The wounded portion itself becomes hard, swelled, and tender, and a thin fluid is discharged. This state either ends in the death of some of the parts, if they were much injured; or the vessels first secrete a matter called *pus* on the surface of the wound. The former state occurs when great debility before existed, as in old or emaciated horses; particularly if added to this there had been much previous hemorrhage; or the parts had been much bruised, or exposed to the cold. In such cases, we must support the strength, as well of the system at large as of the parts themselves, in the manner laid down when treating of gangrene. The formation of pus is usually followed by a cessation of the inflammatory symptoms, and is succeeded by a formation of granulations, to which the suppurative process seems essential. It may, however, itself become inordinate, and require restraint, by lowering the inflammatory diathesis, as already directed in inflammation, at the same time that the topical irritability is to be lessened by the application of fomentations, poultices, &c., by which a healthy and more ordinate action will be promoted; or should gangrene still occur, the separation of the living from the dead parts will have been assisted. When granulations have begun to form, the chasm is gradually diminished until they reach the surface, when exsiccation of the part takes place, and the cutis is formed over it.—*Cicatrization* is the process of forming new skin, but which is never so ample as before, by which means the situation or the scar of an extensive wound is puckered.' It is also hard and ligamentous when fully formed, though at first it is thin, very vascular, and highly sensible. To the formation of skin succeeds the growth of hair, if the injury have not been extensive; but if it have, this is not replaced. In the process of forming granulations, the wound should be kept from exposure, but the applications used should be simple; for whatever is applied, is more for the purpose of defending the part than from any peculiar operation on the sore. Great stress was, by the older farriers, laid on healing ointments, driers, digesters, and innumerable others. Modern surgery has discarded nearly the whole; but as occurs in other improvements, in correcting an evil, too much has been attempted. Experience every day shews that it is not equally indifferent to every wound what is applied to it. I have seen an ulcerated human leg, that would bear *no* application with comfort, but the old compound called *black* basilicon: the yellow, which is so little different, tortured the feelings to madness. Many applications certainly promote a formation of granulations, as all the terebinthinated; but these are seldom necessary, for in the horse the flesh is apt to sprout too fast, except in very deep wounds, or those of glandular parts, in which instances we cannot promote their growth too much. In other cases of luxuriant growth, applications called desiccative, as ointments of calamine, or minium, &c. &c., are proper, as they defend, without promoting the too rapid growth of parts. When the granulations have extended beyond the level surface of a healthy part, they may be deemed diseased, and the wound will never heal while they remain so; on the contrary, it frequently enlarges: for the pressure the luxuriant granulations makes on the edges produces an absorption of the healthy parts, and thus increases the surface of the sore. This luxuriance must, therefore, be kept down by mild *escharotics*.—(See *Mat. Med.*)

It is the general practice of farriers to plug every wound with something of the nature of a *tent*, under an idea of keeping it properly open, by which the healthy processes of nature are frustrated, and simple wounds are rendered complicated and tedious, by this introduction of tow, sponge, candle, &c. &c. In this way also sinuses form, and the edges of the wounds, by being in constant contact with *foreign* bodies, become hardened and callous, and are for ever incapable of union until they are removed either by caustic or the knife. The only circumstances that can justify the use of tents are, where a very deep wound exists, with a very small orifice; in which case it is certainly not prudent to permit the external opening to heal until the granulations have filled the cavity from the bottom: likewise, when any extraneous body is suspected to be within a wound, as thorns, splinters, gravel, &c., or when a bone has been injured; in which case its exfoliation being slow, if the muscular parts healed up, the exfoliating bone would become a foreign body, and occasion continued irritation and repeated new abscesses. In such cases of protracted suppuration, we have a powerful auxiliary in *rowels;* and which, in full plethoric horses, may be likewise inserted in every case of extensive local injury, as near the wounded part as is convenient, by which the inordinate action will be greatly checked. But when on the contrary, from the nature of the wound, the peculiar circumstances of the patient, &c., the action of the parts is really below the ordinary standard, stimulating applications must be made use of. Among which, warm fomentations stand foremost, assisted by terebinthinated dressings, or by pledgets dipped in tincture of myrrh with aloes, or the tincture of benjamin (called Friar's balsam); or one part of oil of turpentine with three parts of olive oil will answer the end. But it is only on such occasions that these applications are necessary; and only in those particular cases before noted that tents can ever be at all proper; for it should never be lost sight of, that it is our business to watch and assist Nature, and not to interrupt her; and it will always be better to leave her to herself, than to interfere injudiciously, which it is the express intention of these instructions to prevent.

WOUNDS OF THE HEAD.

Wounds of the head should be treated according to the part they happen in: in most, the first step is to ascertain whether any injury has been done to the bones underneath, which, if found to be broken, must be first treated by such means as are directed under Fractures. When any part of the *ear* is much lacerated, it will be better to remove the whole ear and its fellow. When, from accident, either the *parotid* or other *salivary glands* become wounded, every attempt should be made to produce a speedy union, or the continued flow of saliva will occasion a fistulous sore. If the wound be small, apply the budding iron, which I have found to stop the salivary flow, and promote immediate union of the divided portion; but if it run into a fistulous state, the only cure is the extirpation of the whole gland, carefully securing the vessels. In wounds of the *eye*, or of the *eyelids*, the parts should be replaced as neatly and carefully as possible, having in view their future functions, so that their motions may not be impeded: in such cases, it is evident, no irritating application should be used, but every means made use of to avoid inflammation. In divisions of the eyelid, neat small stitches of the interrupted suture should always be inserted near together, and the horse should be secured from rubbing, by placing him in a box or barn, with his head tied to a beam in the ceiling, at the usual height, by which means he cannot rub the wound with his knee or his hind leg; nor will there be any rack or manger to rub against: he should also have a cradle constantly on his neck. I have, in one or two instances of wounded eyelids, used the twisted suture with success. (See *Sutures.*) In wounds of the *nose*, care should be taken to replace the bones if any be displaced, and to retain them in their situation, by the putting any firm substance up the nostril well guarded with soft tow or rag; or the fingers may be used if they can reach so high, and the external wound should be afterwards closed, to prevent the unnatural access of the air.

WOUNDS OF THE NECK.

If by any means the *neck* becomes wounded in its ligamentous part, a depending orifice should be immediately made, and the wound should be dressed with terebinthinated or other warm applications, by which the ligamentous substance may be stimulated into an healthy inflammation, and sinuses prevented from forming. (See *Pole Evil.*) When the œsophagus is divided, treat as directed under Œsophagotomy: and if the trachea have suffered in the same way, refer to the treatment under Bronchotomy. The integuments of the neck are not unfavourably situated for the insertion of interrupted sutures; but to prevent their being rubbed out, a neck cradle should be worn, and the horse's head should be racked up to the manger day and night. When it is necessary to perform operations in the neck, by dilating an already existing wound, the longitudinal direction of the muscular fibres should direct the section, and due regard should also be paid to the nerves and blood-vessels around.

WOUNDS OF THE CHEST.

When these take place in the muscular and integumental parts of the chest, they must be treated like other external wounds; but when they penetrate the cavity, the treatment must be regulated by the extent of the injury, and the nature of the parts penetrated. When the lungs are punctured the danger is always great; for should the hæmorrhage not destroy, fatal inflammation is likely to follow. These wounds are distinguished by the air rushing out at the wound, and by the scarlet hue of the hæmorrhage. Having ascertained that no foreign substance is left within the thorax, carefully close the wound by the means already directed, enveloping the chest in a circular bandage. The force of the circulation must be also immediately restrained by copious bleeding; and if blood becomes effused into the cavity of the chest, it should be suffered to escape by the opening already made, and if it will not do this, the operation for empyema must be performed. (See *Dropsy of the Chest.*) If emphysematous swellings take place in the parts around the opening, which may be known by the crackling noise and peculiar feel they will be accompanied with, the extravasated air should be let out by small punctures with a lancet.

WOUNDS OF THE ABDOMEN.

WHEN these are external, the treatment must be similar with that of common wounds; but when such an injury penetrates the *cavity*, much danger arises; nevertheless, as the brute resources are much greater than the human, so wounds that would prove fatal to man, a horse frequently survives. When a wound has penetrated the cavity of the abdomen, the extent of it should be carefully examined, that we may learn what viscera are likely to be injured; in which examination we shall be aided much by a previous knowledge of the different *regions*, as already taught, and the viscera that occupy them. (See *Splanchnology*, p. 263.) If any of these be protruded, carefully replace them; unless they should have become frozen, or mortified, in which case remove the injured and replace the sound part. When the intestines are wounded, the opening in the gut must be neatly united by suture. (See *Sutures.*) It has been recommended, in case the external wound be large, to stitch the intestine to it, in preference to letting it float loose in the abdomen; but I believe it is only particular circumstances can render this eligible. When an intestine is completely divided, the chances of union are small; nevertheless, I should not hesitate to invaginate one portion within the other, and fastening them with suture to return them into the abdomen. The external wound may, if possible, be drawn together by sutures, but much more dependence is to be placed on a firm supporting bandage. In these cases food should be at first avoided, and little drink given, but nourishing clysters are proper; in which, however, we must be guided by what intestine is wounded. In any case, bleed and use every means to combat irritation and fever. Sometimes, from very large openings made in the abdomen by staking, or from the gores of oxen, there follows an extensive protrusion of parts, which must be returned. It will often require much force and more dexterity to do this: I have first placed close to the wound a very firm bandage already drawn moderately tight, and then have replaced the parts with my fingers under it, gradually drawing the bandage onwards as I returned them: the integuments should, in such case, be carefully and firmly sewn up, and an adhesive plaister placed over all, to keep a permanent pressure on the protruding portions*. The internal state of the bowels also should be particularly attended to, that they may never be distended; for this purpose, food should be at first withheld, or given very sparingly in a liquid form only; but nutritive clysters may be more freely administered.

WOUNDS OF THE JOINTS.

THERE are few injuries which prove more destructive than these, and the more so, as the treatment of them has hitherto been grossly injudicious. Most of the parts forming a joint have but little sensibility except under inflammation; but when inflamed they become exquisitely tender; and when we consider the structure of a joint, it will be altogether found particularly unfavourable for a successful treatment under injury; for the internal surface of the capsular ligament is very vascular, but the external is nearly of the nature of other ligaments and has few vessels; the rest of the parts around likewise are such whose powers are comparatively small, and consequently their means of restoration few. Any of the joints may have their cavities exposed; but such injury more frequently happens to the knee, the shoulder, and the hock. Occasionally the hip, the stifle, and the pastern joints, are also penetrated. In describing the anatomy of the joints, the capsular ligament which surrounds them has been noticed, as forming a complete cavity; within which is secreted a slippery glair called *synovia*, and known to farriers and horsemen by the term *joint oil*. When a joint is penetrated, this of course escapes, and the loss of this mucilage subjects the opposed ends of the bone to attrition, and moreover the entrance of the air occasions an inflammatory action throughout the whole extent of the capsular surface. Not only, therefore, from the extreme sensibility of ligamentous parts when inflamed, is the immediate joint itself exquisitely tender and tumefied, but the constitution at large is affected with all the effects of great symptomatic fever; and cases have occurred where this alone has proved fatal. When a joint is newly penetrated, the synovia flows pure, or is mixed with a little blood only, which is very common. In two or three days, the inflammation increases this flow considerably, unless the vascular action be very inordinate, when it lessens it, or occasionally converts it into a muco-serous discharge. If means be not taken to close the external opening, coagulable lymph is thrown out; the articulating cartilages and the capsular ligaments become enveloped with accretion, and their vessels inosculate together; by which anchylosis, or a stiff joint, becomes so frequent a consequence of these injuries. In some cases where the wretched animal does not sink from the first irritative symptoms, protracted sufferings wear him down by hectic. Nor can the fatal effects of these injuries be wondered at,

* It becomes a matter of inquiry how far the flatus, which is usually the grand obstacle to the return of intestine, may be prudently removed by puncture. In two cases in which I practised it on cows, it did not succeed; but in both, symptoms of inflammation had already taken place: in neither could the protruded parts have been replaced by any other means; and in such cases it is both warrantable and to be recommended, and perhaps in such only.

when we are aware how destructive is the treatment they meet with, by the generality of common farriers, who, in these cases, very frequently inject into the sensible cavity of the joint the most powerful stimulants, under the idea of stopping the flow of synovia. Very young practitioners sometimes find a difficulty in distinguishing an open joint from a badly lacerated wound of the integuments, particularly where the synovial opening is minute; but a little attention will detect the smallest quantity of it, from its yellow tinge, glib smooth feel, and its general resemblance to the albuminous glair of an egg in colour and consistence. The junior practitioner is exposed to the danger of another mistake, which may arise from the accidental division of some mucous capsule surrounding a tendon, inserted into the circumference of the joint, and which he may mistake for the cavity of the joint itself. This, however, as Mr. Percevall justly observes, is more likely to happen to the shoulder joint and to the hock, where mucous capsules are so numerous, than to any other.

Treatment.—We must, in every recent case, at once attempt the closing of the wound, and the complete shutting up of the cavity of the joint. In more advanced cases we must, in addition to this indication, combat the more violent symptoms of irritation, local and general. The immediate closing of an open joint is not very difficult, when it has been penetrated by a small uniform cut or division. In these cases the surrounding hair should, if possible, be shaved or shorn clean away, which will greatly facilitate the application of adhesive or sticking strips of plaister, extending from side to side, and then again covered over with an adhesive cap, to embrace the whole circumference. By these means, we shall give the parts a chance of uniting at once, by adhesive inflammation. When the wound is more irregular or extensive, we must have recourse to ligature or sutures, having previously, in every instance, carefully removed all extraneous matter, as dirt, &c. (See *Sutures.*) When these are used, still a great portion of our dependence must be placed in the application of such bandages as will restrain the part from motion, which, in some cases as of the punctured knee and hock, may be assisted by opposing splints; and in all, a neck cradle and tying the head up are necessary. An early and immediate union in this manner unhappily, however, does not so frequently occur as we could wish, and we are often obliged to resort to the more tedious one of promoting a cure by the suppurative process. It is, however, equally indicated here to close the capsular opening at once; and notwithstanding, according to the principles of modern surgery, it is prudent to try the effects of adhesive strips to a longitudinal opening, I should myself, in every instance of a circular one, or one which could be embraced by the application of the mild cautery or heated iron, at once try its effects, from having so frequently witnessed its beneficial operation, and having nearly as often seen the other fail. A wound with a simple puncture or stab may be treated with the budding iron. A more irregular opening may easily have an iron shaped to it, or the budding iron may be more often applied, but which is a less eligible method. The iron should not be heated beyond a dull red heat, and it should be carefully applied to the external surface of the orifice only; for if the inner surface be cauterised, great inflammation may follow. We may judge when the cautery has been sufficiently applied, by the stoppage to the synovial flow. It is recommended by some practitioners, to apply over the fired surface a composition of pipe clay and alum, flour, linseed meal, &c., which uniting a desiccative with an agglutinating quality, may more effectually dry up the surface, and glue any remaining opening. In my own practice, I have usually contented myself with placing a small pledget of lint immediately over the cauterised orifice, assisting the adhesion, when the inflammatory symptoms have not been great, with strips of sticking plaister, but which cannot be properly applied when the tumefaction is considerable: neither, under these circumstances, are tight bandages other than hurtful. Over the whole, a cold saturnine poultice may be applied, and kept frequently wetted anew. If the oozing of synovia recommences, by no means hesitate to apply the iron again, and this as often as the oozing appears, by which eventual success may be ensured. In aggravated cases, after the firing, a blister has been beneficially employed; by some immediately on the part, and by others about three inches below it, and which is the most prudent practice, particularly when the inflammation is intense. It is also of the utmost importance that the general state of the system should be attended to: in a plethoric horse, or when the fever is considerable, bleed plentifully, open the body, and place a rowel in any part near the joint that may be convenient. Feed low, and give febrifuges also.

WOUNDS OF THE MUCOUS CAPSULES AND THECAL SHEATHS.

By a reference to Bursalogy (*page* 146), and to a description of the Extremities (*pages* 335 to 370), it will be seen that there are existing cavities similar to those of the joints, interposed between, or appropriate to, most of the large flexing and extending tendons. Most of these sacs are situated at the ends of the tendons, and are then called bursæ mucosæ, or mucous capsules, being filled with a synovial fluid similar to that within the joints, and serving the same purpose of freeing the parts they are attached to from the effects of attrition. Other bursæ again form more extended cavities around the sheaths of those flexing or extending tendons which move upon each other. In the fore extremities, these are principally confined to the perforated and perforating flexors of the pastern and foot, which form the back sinews. (See *Fore Extremities.*) A very important bursal cavity is situated behind the knee; another extends down a considerable part of the length of the back sinew; and a third is formed at the back of the pasterns, where the perforating tendon performs the office of the capsular ligament to the joint. In the posterior extremities, the first important bursal cavity is at the point of the hock; other bursal sacs exist throughout this important joint. (See *pages* 347 to 356.) Below also, the back sinews present similar thecal cavities: and at the pasterns, both before and behind, bursal capsules, forming similar vascular sacs, are found.

All wounds into these thecal and bursal cavities; that is, whenever any of the puffy swellings called windgalls, capulets, thoroughpins, or bog spavin, are penetrated; and likewise whenever an opening is made sufficiently deep to divide the integuments, and penetrate to the back sinews either before or behind, a capsular or circumscribed cavity is laid open, and the most serious effects ensue; for every one of these possess secreting surfaces like the inside of a joint, and form a mucus like synovia to lubricate and assist motion. These are all liable to be wounded from cuts, staking, from the fork in the stable, or innumerable other injuries: and, in such cases, the inexperienced observer is surprised at the violent train of symptoms which follows so *apparently* small an injury. And here, also, the mischief is usually aggravated by the injudicious use of heating applications, which operate in a similar destructive manner to what they do in wounds of the joints.

Treatment.—This differs in no respect whatever from that which is laid down in our description of Wounds of the Joints. These wounded openings must also, like them, be closed as soon as possible, and the escape of the secreted mucus prevented. If the wound be lacerated and extensive, or the edges ragged, adhesive strips of sticking plaister, spread on leather or canvas, should be carefully applied so as to draw the divided edges together, and thus to close the cavity; and these should be maintained in their situation till healing has commenced. But when the wound presents a smaller and more circumscribed orifice, carefully apply the budding iron, but not red hot, and treat afterwards as directed under joint wounds.

WOUNDS OF THE ARTERIES.

An intimate knowledge of the course of the large arteries is essentially necessary to every veterinary practitioner, by which he may avoid their division in operations; or when such an accident has occurred, such knowledge will assist him in tracing the course of, and stopping the divided trunk. By the elasticity of the external tunic, the divided ends of moderate arteries, and of such as would occasion fatal hæmorrhages in the human, are in the horse attended with no danger; the ends retracting within the cellular substance, and closing their orifices. In many cases, therefore, of partial division of these, a total division puts a stop to the flow of blood, which the veterinarian should keep in mind. *Hæmorrhages* are stopped by the application of styptics; by compression; by firing; or by ligature. *Styptics* are but a delusive term, and have cost, in human surgery, many a valuable life; they act by mixing with the blood, and either form it into a fine paste, as puff ball, flour, cobweb, &c., or they coagulate the blood within the vessels, as alum, vitriol, &c. *Compression* is proper when the vessels cannot be easily got at, and may be made with a bit of sponge or a pledget of any kind pressed immediately on the vessel. The tourniquet is an instrument much in use in human surgery, for effecting compression; but it is not readily applied to the horse, from the superior resistance of parts. In docking, nicking, and sometimes in wounds of the legs, it may, however, be occasionally applied with advantage, particularly in the form of twisted ligature. *Firing* is proper when an artery or vein remains undivided; in which case the hæmorrhage may be readily stopped by the application of the budding iron to the bleeding orifice. It is also the means in general use in veterinary practice for checking the flow on divided *surfaces:* thus, in docking, nicking, castrating, &c., it is generally resorted to, and is found, by experience, to be the safest styptic. In deep-seated wounds this cannot be put into practice; but the best mode of checking hæmorrhage in these cases, is either by means of a tenaculum or hook-like instrument, on which there are some late important improvements; which being applied to the bleeding end of a vessel, draws it out sufficiently to pass a double thread around it: but when it cannot be got at in this way, some of the surrounding substance should be included within its curve, and a ligature passed around it. A ligature is also applied in a similar manner, by means of appropriate needles, on which Mr. Long, of Holborn, has made some judicious improvements. In taking up very large arteries, it is prudent to secure both ends, or the anastomosing branches may furnish the end remote from the heart with blood sufficient to destroy life. The ligatures with which blood-vessels are now tied, are not thick, as formerly, but are found to act best when rather thin than thick.

WOUNDS OF THE VEINS.

When a large vein is divided, it should be secured by a ligature above and below, or the anastomosing branches may continue the bleeding: when smaller veins are divided, the hæmorrhage soon ceases spontaneously. A divided vein will unite, and become again pervious; but an artery will not.

Morbid Consequences of Blooodletting.

There occasionally follow very serious consequences from bleeding, which are of two kinds; one shews itself by a simple effusion of blood from the punctured vein into the cellular substance, occasioning inflammation in the parts around. In the other the vein itself becomes inflamed, and extends its morbid affection towards the head or the heart. In the first of these cases there occurs a thrombus or ecchymosis, from extravasation of the blood into the surrounding cellular substance; originating frequently from an improper mode of closing the orifice, the operator frequently drawing the skin much out to introduce the pin, by which means the blood becomes effused into the cellular substance between the skin and vein: or sometimes the openings between the skin and coats of the vein are not correspondent, which produces the same effect; or they may not be retained in that situation while the blood flows, or afterwards by the pin. Whenever this takes place, press the effused blood carefully out with the fingers, and, if the bleeding appear not likely to come on again, put no pin in, or if one have been already introduced, remove it, and let the horse be watched, and his head tied up. If the effusion have already occasioned inflammation, apply a cold solution of muriate of ammonia and vinegar to the part, or a solution of acetate of lead. If the tumour suppurate, as soon as fluctuation is felt, make a depending opening, or introduce a seton through it.

Inflamed Vein.

This arises from an inflammation of the vein itself; the effect, as supposed, of rusty, dirty, phlemes or lancets, or from the inexpertness of the operator, by which the vein is punctured on its opposite side, as well as on that which presents itself; that is, the instrument has been carried altogether through the vein. Frictions, after motion or improper pinning up of the neck, may also occasion it (see *Bloodletting*); but as it occurs when none of these circumstances appear to have operated, we must search for its origin in other sources, in some instances at least*. It would perhaps be too much to look for these in constitutional liability, but it is more than probable that a particular state of the veins may at times exist, disposing them to take on this morbid state. This disease appears to consist in a peculiar inflammation of the inner or membranous coat of a wounded vein, which shews itself about the second or third day from the puncture, by a small tumour: at the same time the edges of the original orifice unclose, and look red and distorted, while a sanious discharge issues, or sometimes blood itself is poured out. From this state, if the progress be not stopped, the tumefaction extends along the course of the veins; if in the jugular, in general towards the head; and if it occur in any of the other veins of the body, as the saphena and plate vein, it proceeds towards the heart †, hardening the vessel into a cord-

* Mr. Percevall, who considers every case of this kind dependent on some mechanical cause, yet admits that Mr. Cherry, V. S., made numerous attempts to inflame veins, by passing packthread through them, &c. &c.; and Mr. P. himself has failed in every instance to induce such inflammation, when purposely attempted with rusty phlemes, irregular punctures, and even escharotics. Mr. Coleman, in a communication to Messrs. Cooper and Travers, which appears in their Surgical Essays, seems to attribute it principally to the circumstance, "that the most simple wound through the integuments of horses is scarcely ever healed by the first intention, and which is the cause why the punctured orifice in horses does not at once unite by adhesive union as the human." But if such were the case, the disease must happen much oftener than it does. Independent of which, it appears to me that few instances could be brought forward of non-union by the first intention in the horse, so inapplicable as the punctured orifice of the divided vein in bleeding, which, when carefully performed, commonly heals in this way, or why do we direct the pin to be removed the next day?

It is not a little remarkable, that though the common thrombus, from extravasation in the cellular membrane, should be accurately described by Mons. Huzard and other French pathologists, yet I have hitherto met with no French description of this venal affection.

† Mr. Percevall, in treating on this subject, has been at much pains to account for this peculiar disposition in the inflammation to extend so generally towards the head when the jugular is punctured, and towards the heart when it takes place in any other vein; being in the one instance against the course of the circulation, and in the others with it, as is invariably seen in the human. To reconcile these seeming discrepancies, Mr. P. observes, that although the *obstructed state* of the vessel is not the exciting cause of the inflammation, it invariably directs the course of it. It therefore remained to inquire, in what manner the obstruction was prevented in the *previous* course of other veins similarly affected, as the saphena and plate vein of the horse, and the basilic and cephalic of the human. Now these veins, Mr. P. ingeniously argues, freely anastomosing with contiguous trunks, preserve a continual flow of blood up to the obliterated part; but above this, such anastomosis does not exist, the communicating branches being few and small; consequently the blood remains to coagulate and to continue the disease. The jugular is similarly situated upwards, for it has no anastomosis to carry off the obstructed blood above the puncture, in which direction, therefore, the inflammation proceeds, the obstruction being prevented downwards towards the heart; for, having once emptied itself, the inflammation and tumefaction will prevent its receiving more blood, by which means no offending coagulum remains. Thus Mr. P. argues, that the deviation from what is considered as a

like substance, occasioned both by the inflammatory action, and by its forming the contained blood of the venal trunk into a firm coagulum, from which it becomes impervious, and therefore all attempts to save it afterwards fail. Suppuration of the tumour now often appears, though sometimes the immediate punctured part, although much enlarged, will present little more than a spongy mass, from which grumous ichor distils, while abscesses form in various situations above. As the morbid action extends upwards, it frequently involves the whole neck, and often the affected side of the head, in tumefaction, from which results difficulty of motion; and often some difficulty is experienced in eating and drinking likewise. There is commonly some constitutional affection also: in some cases the symptomatic fever runs very high. I have witnessed the pulse at upwards of ninety; and the excess of irritability brought on, has even destroyed life.

Treatment.—The course to be pursued will much depend on the state of the disease and its previous continuance. In the early stages, our efforts should be at once directed towards closing the venal orifice, which is best done by the budding iron applied to the outer edge of the wounded orifice, but of a moderate heat only, sufficient, however, to occasion a slough: with some an eschar is formed by escharotics, as oxymuriate of mercury (corrosive sublimate); but I prefer the iron, as occasioning less after irritation. The cautery sometimes at once stops the ichorous oozing, and saves the obliteration of the vein, which is of considerable consequence, as when lost, it is some time before the vertebral (the horse not having an external jugular as the human) can return the blood sufficiently to support the functions of the parts properly. It will, however, be sometimes necessary to repeat this every two or three days, to ensure success. It is of importance to keep the horse as quiet as possible, and the neck from all motion; which latter is best effected by tying up the head. It is also recommended to apply a blister upwards, in the course of the tumefied vein, and which seems to assist the action of the cautery materially, by lessening the general inflammation above.

When, however, we have no hopes of saving the obliteration of the vein, but, on the contrary, a disposition manifests itself to form abscesses in various situations of it upwards, we must proceed to more active measures. One of which is to take up the vein altogether, by which, in some instances, the morbid action has ceased, and either the vein has become absorbed, or has sloughed away as dead matter. This may be effected by inclosing it within a ligature both above and below, to the extent of its disease. If preferred, it may be then dissected out. But this plan is only to be recommended where the horse is situated at a distance, and not immediately under the practitioner's eye. Neither is it at all practicable, when the tumefaction and the morbid action extends itself to the cellular substance and to the integuments around, forming in them large abscesses and extensive sinuses. In such cases, it is more prudent to pass setons through them, or to apply escharotics, as the case may indicate. When they have not been

fixed law in human pathology, *that this inflammation always occasions obliteration in the vein towards the heart*, is thus reconciled, and that "the same cause is operating under different circumstances."—*Lectures*, vol. i, p. 103.

too deep or numerous, I have succeeded by injecting them with a tincture of Spanish flies, made with oil of turpentine; or with a solution of white or blue vitriol, or any other mild escharotic. The practice of the farriers in coring out the sinuses with corrosive sublimate is commonly too violent; yet I have sometimes found these ulcers get into such an indolent state, as to require very active means to bring on a healthy action in their sides.

Another morbid consequence of bloodletting arises frequently from injudicious bleeding in the plate or in the thigh vein; in which cases, from the force used, or from an improper part being chosen, the phleme passes through the vein into the fascia which covers the muscles, and over which these veins pass. In these cases the fascia inflames, and a formation of matter or pus takes place within it, which, as it cannot escape, insinuates itself to some depending situation: an opening should, therefore, be made to evacuate the matter, or a seton may be passed through it for this purpose, having first premised fomentations to relax the inflammatory tension. In these cases, if a rowel be inserted into the same limb, it increases the evil; but if in the opposite limb, it is frequently beneficial.

BROKEN KNEES.

Horses, when they fall, extend their knees forward to save their head; and as the fore parts usually descend with considerable violence, so there happens, very commonly, some laceration of the integuments of the knees. When the cavity of the joint is penetrated, which may be known by the escape of the synovia, or joint oil, as it is termed, as well as by the extreme lameness and swelling which occur, the case must be treated exactly according to the rules fully detailed under *Wounds of the Joints*. But when there is simple laceration of the integuments only, treat according to the extent of the injury. However, let it be great or small, carefully abstain from the heating applications of the farriers: sufficient inflammation will ensue without the aids, or rather the torments, of turpentine, ardent spirits, oil of vitriol, &c. Wash the wound with warm water to remove gravel, hair, or other foreign matter; and if the laceration be extensive, or the bruise considerable, apply a saturnine poultice; if not, a simple dressing of any mild ointment will be sufficient; which likewise will be all that is necessary to apply when the inflammation is subdued, and the poultice dispensed with: more than this does harm rather than good.

But, to prevent or to lessen the blemish consequent on these cases, is often as much a consideration as to heal the wound itself. Three circumstances are desirable; to bring the hair on; to bring it on smooth; and to lessen the scar. Nothing tends so much to *all* these ends, but particularly to leave a small scar, as avoiding escharotic applications during the cure; but after the part is actually skinned over, it is prudent to apply a mild blister. This absorbs the edges of the scar, and, by removing the old hair, it stimulates the skin to a reproduction of new, of one colour, and lying smoothly. Many recipes are given *to make the hair grow*, most of which are useless, for nothing acts *specifically* in this way: but whatever gently stimulates the skin, may assist *generally*. Use, therefore, the following:—

Venice turpentine	one dram
Lard or goose grease	one ounce.

Mix, and rub the part daily with it.

GUNSHOT WOUNDS.

THESE wounds present some considerable differences in appearance and effect from other wounds, particularly in their first stages; and though wounded horses in battle are not often much attended to, yet, when circumstances admit of it, by proper treatment, many hundreds of those might be saved that are generally abandoned; for, even if they should not prove afterwards altogether fit for troopers or chargers, they may make excellent bat or draught horses, which is a matter of great moment in an army. I have been witness to the abandoning of numbers of wounded horses, which in any other situation than a precarious one, or in an enemy's country, or where a blameable indolence prevailed, might have been cured and rendered useful. In consequence of horses not being impressed with anxiety, from the hopelessness of their situation when wounded, it is surprising how little irritability they shew till the constitution becomes affected. I stood in Holland by a horse which had his hinder leg taken off by a cannon shot, above the hock, but the blow did not throw him down; whereas, in a few seconds after, an officer, who was struck with a spent bullet in the back, that penetrated only through the integuments, was rolled over by the shock. I have been witness to similar instances in different actions.

Gunshot wounds are a species of bruise, in which, from the velocity of the ball, the parts become pressed together and lacerated, sometimes in a very peculiar manner. Any one acquainted with these wounds is aware, that nothing but an attentive examination can discover the track of the ball: there is no reasoning upon its probable course from its entry but what may prove fallacious, for sometimes the slightest substances will turn its path; while at others it penetrates every thing it meets with in its passage: neither can a simple view of a gunshot wound enable us to judge what parts are injured. The laceration and bruises are such in these cases, that there is seldom hæmorrhage at first; but it occurs sometimes unexpectedly in a few days afterwards, when the sloughing takes place: therefore the vessels ought always to be secured when they can be got at, to prevent this, for we cannot keep a tourniquet conveniently on a horse. We must not judge of the extent of the wound by the simple appearance, for the injury may be such as to kill many parts that are not discoloured: this may be particularly remarked in spent ricochet balls. The blackness observable in this kind of wounds does not arise from the balls burning them, nor must the application be conducted under this supposition.

The complexity of the treatment of gunshot wounds arises from the degree of bruise received, not bearing any comparison with the external wound; from the uncertainty of the direction of the ball; and from the introduction of foreign substances, as the ball itself, harness, clothes, &c. It was formerly deemed so essential to remove these, that every gunshot wound was dilated and tortured till the suspected substances were found: the consequence was, that many horses were lost from the irritation unnecessarily occasioned: but it is to be remembered that extraneous substances are a less serious evil than the increase of the original mischief, by too great an enlargement of the wound to hunt for them; yet when it is absolutely necessary to do it, as when the ball can be felt, or when there are large loose masses of harness, or other bodies, known to be left, whose continuance would infallibly irritate, then it should be done at once. With the foregoing exceptions, however, it must be remembered, that, generally speaking, the first thing is to remove the ball and other extraneous matter, and the next to guard against the danger of hæmorrhage. In the sloughing stage we should promote the separation of the living from the dead parts by warm stimulating applications (see *Digestives, Mat. Med.*). When the suppurative process is, however, too great, it should be checked by astringents, and the general strength must be supported by tonics and liberal feeding.

The processes of inflammation, suppuration, and gangrene, having been already fully treated on, to them I would further refer the practitioner; as whatever occurs in gunshot wounds is equally to be referred to the same laws. It remains only to hint, that as these wounds will usually occur when the animal has already undergone many privations, so a lessened necessity exists for much blood-letting or other evacuations; and also that it is still more proper to avoid it when a wound occurs in the neighbourhood of large blood vessels; as, probably, when sloughing commences more bleeding will occur than we wish.

The *treatment of sabre wounds* is also in every respect referrible to what has been said of wounds in general.

CLASS XII.

OF ULCERS.

ULCERATION may be defined to be an alteration, generally a morbid one, whereby some parts become broken down, and absorbed through the medium of the lymphatics. At the same time also that this process goes on, the surfaces acted on, produce a purulent or other discharge. An abraded surface thus circumstanced, is called an *ulcer*, for the cure of which we must endeavour to remedy the morbid action, by exciting a new and more healthy one; the part being then brought to the condition of a simple wound, will heal. When ulcers have continued for a long time, it is often necessary to employ constitutional remedies. In full habits we increase the other secretions, as those of the bowels, the kidneys, the skin, &c., by purgatives, diuretics, and such remedies as act on the skin. We also lessen the excess of morbid secretion of pus, by establishing a new and artificial drain in the neighbourhood, which is done by setons or rowels. In some cases, instead of plethora the ulcer has occasioned, or is accompanied by great irritability of system, which must be combated by opium, and other sedatives. If much debility be also present, tonics must be given, together with a liberal diet. In many cases, stable soiling, a course of carrots, or other total change of food, assists the healing and restorative process greatly. Ulcers are often found of a greater extent internally than externally; and when by this means cavities are formed in different directions, they are called *sinuses*, and *pipes*, by farriers. When the external opening has hardened edges, it is said to be *fistulous*.. In general cases, the longer an ulcer has lasted, the more obstinately will the vessels have gained a diseased habit, and the more difficulty there will be to bring them back to a healthy state. The external means employed for this purpose are usually three; stimulating injections, seton, or incision; which operations it will not be necessary to enter upon here, as we shall proceed to describe the more common and important ulcers, with their *treatment*, separately. It remains, however, to state, that ulcers in general are apt to be treated by farriers erroneously, by plugging up the sinuses, by which the matter formed penetrates farther, bring-into its own action all the neighbouring parts. They likewise dress them so seldom, that the pus frequently takes on a process of decomposition, and becomes acrid; and, lastly, they neglect to gain a depending orifice for these sinuses.

POLE EVIL.

[Taupe.

One of the most troublesome *ulcers* we meet with arises from an injury done to the integuments or ligaments, or to the mucous capsules at the junction of the head with the first vertebra, near the insertion and first attachment of the cervical ligament, or farriers "*fix-fax*" of the neck, and which, after it has proceeded to an open sore, is called by farriers *pole evil*. It is most common in large coarse horses, and is not unfrequently brought on in them by the continual itching of the roots of the hair of the mane, which occasions them to rub the head against the manger continually, and sometimes so violently as to bruise the parts underneath. It is also, sometimes, occasioned by hanging back in the stall, and thus forcibly pinching these parts between the collar rein, or halter, and the cervical bones. Blows act in the same manner. When the early tumour forms on the integuments only, it will often submit to external applications, and perfect *resolution* takes place: but when the ligamentous parts have become injured, resolution is less likely to happen: on the contrary, from the living powers of these parts being comparatively small, an unhealthy inflammation follows, and a double action is the consequence: a suppurative one in the integuments, and an *ulcerative* one in the tendinous and ligamentous parts which surround the attachment of the cervical ligament; from which circumstance it is that we so seldom meet with healthy pus from pole evil; but, on the contrary, a thin sanious discharge, or sometimes a more glairy one, when any of the mucous capsules are affected.

Treatment of pole evil.—When the injury which usually occasions pole evil is first discovered, if not very violent, it will frequently, as before noticed, yield to the applications of discutients, as the muriate of ammonia (*crude sal ammoniac*) diluted with vinegar, or to saturnine washes (*Mat. Med.*), applied cold and frequently renewed. In one instance, where it appeared to remain stationary, I promoted the resolution by the application of the liquid blister; but it is only under such circumstances that such a plan would be advisable. When all hopes of preventing the formation of abscess have ceased, we should then promote the formation of matter by fomentations, or by warm poultices, or by the application of an adhesive plaister spread on leather. When the maturation is perfect, which may be known by the soft feel of the tumour, the next indication is to procure a speedy evacuation to the contents, and a depending orifice for its future passage, that no sinuses may form; this is best done by the introduction of a seton on each side of the swelling, beginning near the mane, and passing it to the bottom of the abscess; doing the same by each side, by which means this early state of pole evil may usually be speedily cured. But when, from improper management, matter has not only formed, but has been suffered to remain, or has only evacuated itself by a superficial opening, either natural or artificial, and not from one in a depending situation, whereby accumulation has taken place, and the ligaments have become extensively diseased, extending under the cervical ligament, and leaving it hollow below. In such cases, the healthy secretion of pus always ceases, and instead, a thin ichorous or a glairy discharge succeeds; the ulceration extends, sinuses form in every direction; some of the bursal cavities open, and not unfrequently the cervical vertebræ become carious. To prevent or to remedy these evils, we must cast the horse, and having ascertained, by a careful examination with a probe or the finger, the extent and direction of the sinuses, proceed to make a lateral opening in the direction of the muscular fibres. As it proceeds, probe in every direction, and occasionally introduce the finger also; which will be more likely to detect an early caries than even the probe. If such exists, it must be dissected out, or a cure cannot be formed; but it will increase and spread the disease. Hardened callous edges must be removed, and the smaller sinuses laid open, so as to form one continuous cavity. If all this be not thoroughly done, it will happen that when the whole seems on the point of healing, a new tumour will suddenly arise, and frustrate all our hopes, which renewed abscess, in every instance, arises from some carious bone being left, or some diseased ligamentous portion remaining. In this way the experienced veterinarian, who is expert with his knife, and acquainted with the anatomy, will combat the worst cases. But in other hands much mischief has been done by an injudicious use of excision. For instance, some have even commenced their operations by opening the tumour by a crucial incision at the summit of the neck, forcing the skin and muscles to recede beyond the power of surgery to reunite them. In other instances, the cervical ligament itself has been divided.

Instead, therefore, of hazarding any of these evils, the junior practitioner will be justified, particularly if the sinuses be few and extensive, but deep, to proceed by introducing a seton needle armed, from the original opening to the most depending situation, doing the same by each sinus or pipe. Each seton tape should every day be touched with liquid blister, or blistering ointment, till the matter from the wound become of a good consistence. But in cases of great obstinacy, when this also fails to produce a good effect, I would recommend him to proceed to try the effect of escharotic injections, as the following:—

Nitrated quicksilver *(lunar caustic)*	one dram
Water	two ounces.

Dissolve, and with a pledget of lint, wash the inside of the wound, or inject with a syringe, or try the following:—

Muriated quicksilver *(corrosive sublimate)* . .	two drams
Water	three ounces.

Humanity requires that he should first try all these milder means; but unless an evident and decided amendment be quickly apparent, too much time should not be wasted in the use of them; for frequently cases will occur in which the disease has so completely got possession of the ligamentous parts, that all milder means must fail. In these instances, the *scalding mode* of the farriers will be found his best resource, and the only one whereby he can overcome the morbid action, and produce a healthy inflammation, from which granulations may follow: any of the following formulæ may be used for this purpose:—

No. 1.—Arsenic, very finely powdered . . , . .	one dram
Cerate of resin *(yellow basilicon)*	four ounces.
No. 2.—Muriated quicksilver *(corrosive sublimate)*, very finely powdered	one dram
Cerate of resin *(yellow basilicon)*	four ounces.
No. 3.—Caustic potash	one dram
rubbed down with	
Oil of turpentine	four ounces.

Either of these may be melted to a scalding heat, when, having secured the horse in a favourable position, pour it hot into the cavity, so as to penetrate all the sinuses. A solution of lunar caustic is also a proper escharotic in these cases, or verdigris and tar: but either of the foregoing are excellent, and sufficient for this purpose. In case the outer opening of the pole wound is not sufficient for the sinuses to be readily got at, it must be enlarged. After the *scalding*, wait for the sloughs to separate, which will be three or four days; then dress with any mild ointment; and if, after this, healthy matter shews itself, and granulations arise, a cure will proceed: but if the discharge again become ichorous, and the sore look unhealthy, at the end of a week or ten days from the first scalding, repeat it again as before.

FISTULOUS WITHERS.

When a saddle has continued to press on the withers, by the improper management of an incautious rider for a whole day, and the evil has, perhaps, been repeated the next, the consequence is frequently an inflamed tumour, which should be dispersed in the manner recommended in the former case: but if the heat and swelling remain stationary, we should apply poultices to promote the formation of the matter, and as soon as ripe it is not prudent to wait its bursting, but to open on the affected side in the depending part; or what will, I conceive, be preferable, to pass a seton from the top to the bottom of the tumour: if it appear on both sides, place a seton on each of them. But should the attention be called to a case that has proceeded to a fistulous state, treat exactly in the same manner as with pole evil. Instances have occurred where the matter has penetrated under the blade bone, and made its way to the point of the elbow or shoulder: in these cases a dependent orifice should be made, and a seton introduced*. This disease has injured the dorsal spinous processes forming the withers. In any such case, exfoliation should be encouraged, or healing will not take place.

Fistulous sternum.—Occasionally the point of the sternum becomes so much tumefied by blows or pressure, as to proceed to suppuration, in which case a fistulous state of the wound is not uncommon. The *treatment* of this must be regulated by circumstances, but will follow the rules laid down for fistulæ in general.

ULCERS IN THE MOUTH.

There sometimes appear small ill-conditioned ulcers in the mouth: the continued irritation of a ragged tooth has sometimes occasioned it, or a wound from a sharp bridle. When they are accompanied with any appearances of constitutional affection, they must be considered as symptomatic, and the general disease attended to; but when this does not occur, their removal may be brought about, by touching them lightly with the following:—

Subacetate of copper (*verdigris*)	one dram
Honey	one ounce.

The *Ulcers* of farcy and glanders, and those arising from grease, are treated of in their proper places.

STRANGLES.

It is truly remarkable how very contrary the opinions of almost all the writers on this subject have been, and how lamentably ignorant appear their descriptions of it. Mr. Prosser, though he wrote a treatise professedly on the strangles and fevers of horses, in which he introduced some excellent critiques on other writers, yet left both subjects entirely where he found them. Gibson supposed the complaint resembled small-pox; Bracken, the quinsy; others, the hooping-cough, measles, small-pox, chicken-pox, &c. All which suppositions originated in a want of attention to the animal economy in general, and to the disease in particular; for it bears no more resemblance to either of these than as it attacks horses about the adult period, and as it appears only once. In other respects it may be characterised as a catarrhal affection, accompanied with a specific phlegmonous inflammation of the cellular substance in and around the parotid and submaxillary glands, tending in most instances to abscess. La Fosse divides it into mild or malignant, and false or bastard strangles: but these definitions do not seem to be well founded, for though there are

*At Mr. Long's will be found seton needles of immense length, purposely to embrace these cases.

cases in which the symptoms are milder than others, it does not appear that any specific virus is ever left, by which future depositions are formed, called *vives**. There is no reason to suppose the strangles infectious, though it has been said to have been given by inoculation. A number of horses having it together, is not a proof of its contagious properties; any more than some escaping and others having it, is a proof it is not so. The strangles, in many instances, produces so little interruption to the health, particularly in mild weather, and at grass, as to inflame, maturate, and heal, without the matter being hardly noticed. In some cases, however, it reduces young horses to a state of considerable emaciation, and it has been said, when very long protracted, to degenerate into glanders.

Symptoms.—The disease usually commences with the common symptoms of mild catarrh, or, as popularly expressed, of slight cold and fever. The horse is somewhat dull, has often cough, some soreness of throat, a slight disinclination to food, but still more to water. The under surface of the throat between the jaws swells, and is hot and tender: sometimes the tumefaction extends to the ear of one or of both sides. On the second or third day it is not unfrequent for the nostrils to throw out a muco-purulent discharge; and if the affection be considerable, his mouth is suffused with a mucous discharge also, or his saliva is slabbered out in great quantities†. Now and then the lungs become slightly inflamed, and heaving at the flanks, with oppressed pulse, are present. In most instances the pulse is somewhat hurried.

Treatment.—When the inflammatory symptoms are considerable, treat exactly as directed under catarrh, with this single exception, that the bleeding is not to be pushed, nor even to be attempted at all, unless there be some urgency in the case; that is unless the pulse be hard and much quickened, with considerable heaving at the flanks; or the extremities be cold, the cough painful, and the nostrils red; then bleed without hesitation. Keep constantly to the head a nose bag, with a warm mash frequently renewed; put on a hood, and having

* Few terms in farriery are more indefinite than that of *vives*. I have scarcely ever met with any swelling of the head, which has not been attributed to *vives*, or, as I understood the matter, to the strangles not "cleared off."—If the inflammatory attack of strangles had left any enlargement in the parotid or submaxillary glands, then it was as impossible to deny the existence of vives, as to convince farriers they were not the occasion of bad eyes, lampas, and even glanders; and as though well "drained strangles" were to render these glands invulnerable to any accidental tumefaction afterwards, when such did take place the "undrained strangles" had degenerated into *vives*. When older horses have strangles, it often happens that the tumid glands do not suppurate so readily as those of younger horses, and here some enlargement is often left. These are sure to be called cases of "*rank vives*," which is or are (for I know not whether vives be singular or plural) the very *bogie* in the imagination of the farriers of the old school.

† This nasal discharge appearing before the suppuration of the salivary glands, is called by farriers the *bastard strangles;* but which symptom has little to do with the specific inflammation of the strangles, but is rather a common symptom of the catarrhal affection which accompanies strangles, and which I am disposed to think is, in many instances, merely the exciting cause of the specific action. That is, that such colts in many instances take cold, and catarrh follows; the predisposition to strangles existing, is now brought into action, and accompanies the catarrh, which is itself purely accidental. This view of the matter will serve to explain the diversity of symptoms, and the great difference in intensity in the disease.

first rubbed the swellings with an ointment of equal parts of suet and turpentine, apply a warm poultice, and repeat it every twelve hours. Should the hair covering the glandular swellings be very thick, remove it; and particularly observe that the poultice be properly secured, so as not to fall off, nor become detached from the part. The reason for which caution is, that should air get between the poultice and swelling, it would become a source of cold, from the evaporation occasioned, and this would act as a repellent instead of a promoter. Hot fomentations may also be applied to promote suppuration; but it is seldom that they are continued long enough to be useful, and the parts are apt to be left wet, and subjected to cold afterwards. To obviate these serious inconveniences, Mr. Peel recommends at once to blister these swellings, which he assures us, in every instance, is found to promote the formation of matter without the smallest inconvenience.

The tumours having suppurated, sometimes burst inwardly, in which case the future cure must be left principally to nature, and nothing more, in general, will be requisite than mild food, as green meat, if procurable, and gentle exercise. But when the tumours point outwardly, as soon as the matter is felt to fluctuate freely, but not before, they should be freely opened with a lancet, which will tend to shorten the complaint considerably. It is customary to squeeze the abscess violently with the fingers to press out the matter, which is wrong; a very slight pressure for this purpose is proper, but only a slight one; and if a natural opening have occurred, and should be small, either introduce a pledget smeared with digestive ointment to keep it from closing up, or, what will be better, enlarge it, or apply, for a day or two, a poultice. In every other respect the proper treatment is so exactly similar to that prescribed for catarrh, or cold, that we shall pursue the matter no further.

CLASS XIII.

OF INFLAMMATORY TUMOURS.

THE *Tumours* of the horse may be divided into such as are accompanied with active inflammation, and those without. Among the former, the most common are the phlegmonous. *Phlegmon* is a painful throbbing tumefied state of a part, accompanied with increased heat, and all the other appearances of *healthy* inflammation.

Abscess.—When phlegmonous inflammation exists and does not give way to medical treatment, but proceeds to suppuration; the following process has been found to take place in the inflamed part, by the examination of innumerable subjects in every stage of the complaint, and under every variety of it. The first stage is that, wherein the distended vessels pour out coagulable lymph, from which increased action arises throbbing, as the deposit occasions swelling and tension; irritability of the parts producing the pain and tenderness, as the increased vascularity is the occasion of both the heat and redness. At length, within the centre of the adhesive mass, the suppurative action commences, and the more active symptoms give place to general rigour:

and if it proceed, the condensed deposit becomes absorbed, and the whole internal surface is converted into one of purulent secretion. Nothing now obstructs the process of ulceration, which happily commonly proceeds outwards, from which the sides of the abscess become daily thinner and thinner, when it is said to *come forward.* At length one part becomes more prominent than the rest, at which *point* it usually bursts, and evacuates its purulent contents.

The *Treatment of Phlegmon.*—In the early stages of this inflammation, the tumour will often yield to the remedies detailed under local inflammation. In Franee, I was witness to a plan of treatment which, in the two cases I saw, was eminently successful. Powerful stimulating applications, as blistering, &c. are there first tried, which, if they are not immediately attended with evident advantage, two or three scarifications are carried down to the bottom of the tumour, and the parts are afterwards likewise dressed with stimulating applications. This method has been both recommended and practised among us in human surgery with advantage; but I believe it is rare in veterinary practice, but will merit more general trial.

When abscess has formed, it is always prudent to open it, giving sufficient vent to the matter, and in the most depending situation. This may be effected by a scalpel, bistoury, or large lancet. When the situation is such as to make it feared that the matter will not freely evacuate itself, it is sometimes prudent to effect the opening by passing a seton through it. And at other times, when the suppuration has been tardy, and it is supposed some parts underneath are affected with an unhealthy inflammation, the opening has been made by caustic or cautery. Abscesses forming in some parts are apt to degenerate into ulcers, under which class we have particularised the most important, as pole evil, fistulous withers, &c. &c. Strangles also is an abscess of the cellular membrane around the salivary glands; but it partakes somewhat of a specific nature, by which it only occurs once to each animal.

CLASS XIV.

OF INDURATED TUMOURS.

RHEUMATISM.

FORMERLY, I had some doubt whether the horse was ever affected with *rheumatism;* for I was disposed to think that what the farriers term *flying lamenesses*, were commonly ideal or dependent on other causes: and the cases of this kind, which fell under my own notice, I attributed to very different sources. But since that time conviction has been forced on me by many well-marked cases of a rheumatic nature; and other intelligent practitioners I know have witnessed the same. The French writers all treat on this complaint as common to the horse, and describe it as a painful affection, accompanied with lameness resembling the cramp, and which shifts from place to place. Some of the older farriers meant this malady when they described *chest founder*, which they considered to be an inflammation of the intercostal muscles, and from thence called it *external pleurisy*. The pectoral muscles, it is certain, become a common seat of the complaint, and of course at this time a considerable stiffness appears on moving: if the affection be long continued, or often repeated, it likewise occasions a lessening and wasting of these muscles; and as the same circumstances happen from the pain and inactivity brought on by foot founder, so one common term of founder (this has been also called *body* founder) has been intended to describe such opposite diseases.

Rheumatism, either acute or chronic, may be occasioned in various ways; as by dashing cold water over a horse when hot; by suffering him to stand unusually long without doors; by swimming him; but particularly by riding against a bleak wind; or, in fact, by any undue exposure to cold. Under these circumstances, it happens frequently that, on the following day, a horse is found to be very stiff, and painfully affected in some of his limbs or in his loins; more generally, howver, it affects the muscles of the shoulders and chest, which are, in some cases, slightly tumefied, and tender to the touch. I have witnessed instances where this complaint took on an acute form, and were evidently occasioned by cold. In every one there were present universal stiffness, great fever, and an evening exacerbation: the cold rigors were strongly marked, and the subsequent heat and sweating as distinct. I have always bled largely, opened the bowels, employed extensive embrocations, inserted rowels in the chest and belly, and have given antimonials internally. One of these perfectly recovered in ten days, another in a fortnight: a third was not well till the fourth week. A local rheumatic affection I have many times witnessed, but this universal and acute attack is, I believe, rare. When this complaint occurs in the loins, it is commonly attributed to strain or blows.

Treatment.—I have treated the *chest founder*, as this complaint is commonly termed, variously, according to circumstances, or agreeably with my views of the matter at the moment. By my notes of practice, I find that, in one instance, I fomented with success; but in this much caution is necessary to rub completely dry afterwards, and to clothe warmly: in another I used stimulating applications, and gave antimonials. In a third, where the stiffness was extreme, I bled in the plate vein, and inserted a rowel into the chest; which practice I was led to by having witnessed, in the former case, a serous effusion in the cellular membrane of the muscles, which followed the attack, and proved difficult to prevent from proceeding to suppuration; which is not an unfrequent result of these affections, though less frequent with us than with continental horses, where the tumour so formed is termed *anticor*, i. e. *before the heart*: it also receives the same appellation by our farriers. In one instance that fell under my notice, such suppuration followed a very slight rheumatic attack, and in a few months reappeared, apparently then without the rheumatic stimulus: in another, the origin and termination accompanied the exciting affection distinctly. The *proper treatment*, whether its seat be in the loins or chest, will, therefore, consist in stimulating topical applications to the part, warm clothing, rest, and mild food: in case the febrile symptoms are considerable, bleed, and in every instance open the bowels, and give antimonials with nitre.

It remains to remark also, that if the *flying lamenesses* we meet with are most of them rheumatic, which there is great reason to believe to be the case; then it is common to observe them attack every part of the extremities. I once possessed a valuable horse, which I kept some years, which I bought with the character of being occasionally lame. He would sometimes work a week or two perfectly sound, and then become lame for two or three days. His feet were excellent, he had no corns, and was wholly without blemish. It could arise from no ligamentary strain, for it was neither better nor worse for work, nor was he lamer when he set off than when he had gone some distance. It appeared to be confined principally to the off shoulder; and it was particularly remarked, that when he returned hot from exercise, and was not immediately attended to, his lameness was sure to come on. Every other practitioner must also have met with instances of lameness returning at uncertain periods, of which the cause is not apparent. The older farriers always attribute these to humours, and, therefore, give physic: and though the cause thus considered is erroneous probably, yet the treatment is, nevertheless, judicious; for I have never found any mode that was so certainly efficacious as this, though I have tried others: nor is this the only instance in which the older methods of cure, founded on long experience, prove the best, as in other instances they prove very bad.

ANTICOR.

This is described as a species of tumour in the integuments of the chest or abdomen, which all the old writers on farriery mention, but most of them without having seen it. It is said to be more common on the Continent, but in England is not often met with. I have seen two instances only; one evidently referrible to rheumatism, the other arose from some cause not apparent.—See *Rheumatism.*—The indefinite nature of the language used in farriery, has appropriated very different affections to one term: thus, when pressure or blows on the point of the sternum have tumefied and proceeded to suppuration, these have also been called anticor in old books of farriery.

WARBLES.

These are tumours which arise in consequence of the pressure of the saddle. If the pressure have been continued, they suppurate, and form a troublesome sore for some weeks. If they remain indolent, and the irritating cause be slightly kept up, coagulable lymph is thrown out, which does not become reabsorbed, and they then form *sitfasts*.

As soon as the tumours are perceived, to prevent these consequences, give the horse perfect rest; but if this cannot be granted, let the saddle be properly chambered, and in either case apply a solution of lead, or muriate of ammonia (*sal ammoniac*) and vinegar. When a sitfast is formed, by no means tear it out; but if large and very troublesome, let it be blistered: if this should not remove it, it may be carefully dissected out.

CONTUSIONS OR BRUISES.

These are tumours formed by some external injury, wherein the continuity is not interrupted; but a rupture of the smaller vessels occasions an extravasation of blood within. If the injury be small, the parts will reinstate themselves, the extravasated blood will become absorbed, and the tumour removed: but, when the injury is violent, the parts may be unable to reinstate themselves; the extravasated blood will then become a source of irritation, and suppuration will follow. Should a still higher degree of violence be offered, the entire tone of the parts becomes destroyed, and sphacelus must take place; when the living parts will make an effort to remove the dead, and ulceration and an extensive sore will be formed. At other times the blood thrown out, instead of irritating or becoming absorbed, coagulates, and at length becomes vascular, when the part remains permanently enlarged.

The *Treatment* of bruises must vary according to these several circumstances. We should always endeavour to reinstate the part, and promote the absorption; which may be done by giving local strength by external stimulating applications, as saline matter with vinegar, verjuice, spirits of wine and camphor, &c. If the blood remain fluid, promote its escape by making a small depending orifice. If it suppurate, treat as a common abscess. When sphacelus occurs, treat as under mortification. If the tumour remain indurated, stimulate the absorbents by mercurials, by friction, or by blisters, and, if very obstinate, by fire.

MUSCULAR, TENDINOUS, AND LIGAMENTOUS EXTENSION, CALLED STRAINS.

Very few subjects have occasioned more diversity of opinion or difference of treatment, than what are called *strains*. This is to be the more regretted, because these injuries are very common, and exceedingly ruinous; while only a moderate knowledge of the physiology of the animal body, and of the leading features of pathology and surgery, would generalize the mode of treating these cases, and would reduce it to principle; on which alone uniformity, and in fact success, can depend. By a *strain*, we understand a violence done to the muscular, the ligamentous, or the tendinous parts, which, without actual laceration of fibre, yet subjects them to greater extension than their structure is able to resist, and thus interrupts their functions. The consequences of strains are often rendered very serious from the nature of the parts injured, which are more frequently the tendinous and ligamentous than the muscular, which, having little vascularity, and consequently few powers of life, are not readily restored. But when an extension of a purely muscular mass occurs, although the symptoms at first be very considerable, from the extreme vascularity of the part, yet the same vascularity operates a speedy reinstatement from the effects of the injury. Not but that great and immediate inflammation often follows strains of parts where little muscular substance is found, which arises from the injury done, not to the tendons and ligaments, but to the cellular membrane investing and connecting these parts, and to the thecæ or sheaths of the tendons, both of which are highly vascular. It is also apparent that, in violent exertions, some of the connecting cellular membrane may be lacerated, or some of the connecting ligaments also, together with the thecal investures, which must greatly aggravate the symptoms, protract the cure, and tend to leave a permanent enlargement of the part. Although some elasticity cannot be denied to the tendons and ligaments, yet they certainly have not much; and any treatment founded on considering strains as an over distension of the natural elasticity of these organs, as was formerly done, is founded on wrong principles, and leads to an injudicious treatment. Having proceeded thus far on the subject generally, we will now enter on an examination of each individual strain, according to the part it affects.

EXTENSION *or* STRAIN *of the* SHOULDER.

What is now generally known by the term *shoulder strain*, was formerly called chest or body founder. It appears to consist in an unnatural extension of the muscular or ligamentous parts of the scapula, operating the motions of the shoulder, and serving to connect it with the body; and which parts, it must be evident, are very liable to this kind of injury, from the great extent of motion the omoplate enjoys forward and backward, and its close confinement laterally. *Shoulder strains* are, therefore, frequently the consequences of a side wrench, or slip, which, by separating the fore legs too widely, puts these parts suddenly on the stretch. The adductor muscles, or the sustaining ones, as the serratus major, are usually the sufferers on these occasions: sometimes, however, the ligaments of the articulation are principally affected. Mr. Percevall, on the contrary, attributes this affection almost always to an affection of the tendon of the flexor brachii: but when it is considered that the principal seat of tenderness in most of these cases is within the arm, close to the chest, it is difficult to reconcile this as the general seat of the disease. *Shoulder strains* are rather rare occurrences, much more so than is generally supposed; for farriers and persons about horses are led, from habit, to attribute every lameness they do not exactly understand, and whose seat is not self-evident, to an affection of the shoulder: and when, on viewing a horse in front, the muscles of one or both shoulders appear wasted, it requires more than usual exertion to make even intelligent persons believe that the evil did not originate where its effects are so evident. In all affections of the feet, where there is much pain and lameness, and the animal consequently much at rest, not only the external but the internal muscles of the shoulders waste: this draws the fore legs closer together, the spine of the bladebone becomes prominent, and the whole substance seems lessened. This appears to have two origins; one from inaction, in which muscles always diminish as a necessary consequence; the other proceeds from the pain disturbing the healthy functions of the part.

It is very necessary, therefore, to be able accurately to distinguish a *strain in the shoulder* from the numerous affections with which it is often confounded. In *these cases*, it appears to give the horse extreme pain to extend and advance the leg, for which reason he drags the toe along the ground, and having rested the limb, he drops considerably, and again catches it up quickly. Mr. Percevall says, little pain is felt in walking, which is certainly not always the case: I have usually, on the contrary, found the difference between walking and trotting, comparatively with the exertions required, not great. These cases are farther characterised by the extreme difficulty with which a horse moves down the slightest declivity, from the weight being thrown on the shoulders: and, when the ligaments are the principal seat of lameness, the horse even, in walking, swings the leg round in a remarkable manner: in fact, he evidently attempts to describe the circle of the whole limb in any direction, but that in which the motion of the shoulder must take a very active part. At rest, the limb is generally placed forward in a relaxed position, resting on the point of the foot: and this will particularly serve to distinguish it from affections of the feet, in which, though the whole limb may be carried forward and *point* the toe, yet the leg will be set straight out, and not relaxed; neither will it rest on the toe, but on the entire foot. In shoulder strains, if pressure be made between the fore leg and chest, in the direction of the serratus major, and other attaching muscles, the horse will flinch considerably; and as a farther mode of distinguishing this affection from those of the feet or other parts, with which farriers are so apt to confound it, if the foot be elevated forward considerably, and the whole limb at the same time brought out into a straight line, it will give intense pain if the shoulder be the seat of lameness.

Treatment.—When the heat and tumefaction are considerable, and the injury is at all recent, it will be prudent to draw blood from the plate vein, giving also a dose of physic, and otherwise treating the horse to keep down inflammation. Let the parts be kept constantly well wetted with Goulard's wash, which, if it fail to mitigate the heat, change to warm fomentations applied three or four times a-day, for twenty minutes each time, carefully rubbing dry afterwards. In these instances, when the heat and tension are not very considerable, but when the lameness is yet recent, there will be reason to consider the ligaments as particularly affected, in which cases insert a rowel in the chest, in addition to the other treatment. The ligaments of either the shoulder, or of the arm or elbow joint, may be the seat of the strain, which a careful examination will detect. If the affection appear in front towards the point of the shoulder, invest the whole circumference of that part, as soon as the more active symptoms are removed, with a blister. If the junction of the arm with the fore arm be affected, blister also; but when the evil evidently exists in the muscular parts principally, which, as before noticed, is known by the inner side of the arm being tumid and tender, I would recommend the following practice, which I have long pursued in these cases with invariable success. As soon as the more active inflammatory symptoms are abated, I proceed to raise an artificial inflammation by the free use of stimulants, generally of the liquid blister, in the following manner: Mix six ounces of common oil with two or three ounces of liquid blister (see *Mat. Med.*), and with this rub the whole affected part twice a-day, until the swelling and inflammation it will bring on prevent the use of more. In two or three days these will subside, when it should be repeated, until the same effects again prevent the application. In this way keep up a mild inflammation for a week or ten days, according to the original violence of the affection. In general cases, the subsiding of the second swelling will leave the horse sound. This will be found a much more efficacious mode of practice than the common blister; but it must be particularly remembered, that I know of no affection so liable to return as this; consequently, although the horse may appear sound, it will be very dangerous to put him to immediate work: on the contrary, it will be more prudent to turn him out to grass, if possible alone, or with cows only; otherwise, by playing and galloping with others, he may renew the injury. Swimming a horse for shoulder strain is a very common remedy among the older farriers, under a supposition that dislocation has taken place; but which practice is founded on an ignorance of the anatomy of the animal, and always proves hurtful. Much less injurious is the old-fashioned mode of *pegging*, which consists in making an opening in the skin of some part of the shoulder, and then, by means of a pipe, blowing in air, exactly as butchers blow up veal. The air thus introduced raises considerable inflammation, after the manner of a blister, and thus may do good, though not more than any other stimulant.

Blows on the Point of the Shoulder.—These injuries occur more frequently than strains, and are often productive of more present lameness, and consequences eventually more serious. Turning suddenly in a narrow stall, running against a hard body, or being kicked, or violently struck, may any of them occasion it. There will be great tenderness and heat at the point of the shoulder, some swelling, and the lameness will be extreme. In such cases bleed in the plate vein; insert a rowel in the chest; foment the part; and, when the heat and swelling are reduced, blister.

EXTENSION *of the* FLEXOR TENDONS, *their* SHEATHS, *and* LIGAMENTOUS CONNEXIONS.

A *strain* or *clap* in the *back sinews,* according to the phraseology of farriers and horsemen, is a very grave and serious evil. It has been already stated, that it may be accompanied by laceration of some of the ligamentous fibres. It is, however, more generally confined to a simple distention of these parts, and of the sheaths of the tendons, beyond their structural capacity; although there is little reason to doubt but that the tendons themselves are also sometimes thus acted on. It may occur to the flexors, both of the hind and fore limbs; and may be brought on by any thing which acts violently and suddenly on the limbs, as downward leaps, attempts to recover a false step, treading unevenly on any hard and prominent substance. It is also occasioned sometimes by lowering the heels too much and too suddenly, by which unusual weight is thrown on them. The injury received brings on inflammation, with its accompaniments of heat, swelling, pain, and tenderness, with an incapability of extending the limb. The effusion from the inflamed vessels, which at first is merely serous, may be reabsorbed; but if the cause be reapplied, or improper applications be made use of, coagulable lymph may be thrown out between the tendons and their sheaths, which, not being so readily absorbed, may remain, and form those permanent callosities around the back sinews, which so frequently follow these accidents, and which, by obstructing the freedom of motion, occasion a lameness much felt after very hard work, and likewise at first starting; but which, after the horse has been some time in action, as his attention is drawn off, he feels little of. Part of the obstructing deposit is likewise actually removed by the exertion; and thus, as horses with old strains go better when they have moved some time, it has induced some persons to hold it as a maxim, that a strained horse may be *worked sound*. It would be as humane and as reasonable to drive the crippled soldier with one leg till the other grew.

The *Treatment of thecal and ligamentous distention* or strain.—If the principles already so fully laid down on the subject of inflammation be attended to, it will be hardly necessary to enter into particulars here. The inflammation in the limb must be promptly combated by bleeding in the plate, or thigh vein, according as the injury is before or behind; or blood may be drawn from the toe with great propriety. Warm fomentations, in the very early stages, will tend to unload the vessels. The same indications will be likewise followed by large poultices, or immersing the whole limb in warm water. In two or three days, change this plan for a Goulard poultice or embrocation, until the heat and tumefaction have considerably subsided. Any treatment more stimulant than this in the early stages, only tends to increase the deposit of lymph, and to organize it into a permanent tumour: how much more erroneous, therefore, is it at once to blister strains as soon as they happen, as is sometimes practised! When the tumefaction, heat, and tenderness, begin to subside, then mildly stimulating and tonic applications are proper, as the muriate of ammonia with vinegar, camphorated spirits, verjuice, and gin, in equal quantities, either of which may be rubbed in three or four times a-day, continuing the friction for twenty minutes each time, which will greatly tend to promote the absorption of the deposited coagulable lymph, and prevent the cellular membrane from becoming irretrievably thickened, or the sheaths of the tendons obstructed in their motions around them. It is also of consequence to attend to the constitution; for there is often present much symptomatic fever, which must be reduced by the proper means of general bleeding, physic, cool stables, and low diet; and which attention is of more consequence than may be at first sight apparent. For it is to be recollected that metastasis is continually taking place in the body; and the inflammatory diathesis of the constitution generally, induced by want of exercise, increased irritability, and heat, will invariably augment the existing local evil; as every thing which tends to take from, or obviate this state in the constitution, will subtract it also from the injured limb. No fears need be entertained, that by these means the horse may be "thrown out of condition." Not only will long rest be necessary for the establishment of the parts, but one week's pain and fever will injure his condition more than all the constitutional means recommended here.

It being supposed that the heat and tenderness are removed, and the lameness in some measure also, it becomes necessary to regulate the treatment by the effects which remain. It is seldom but that some will continue for a time; and even when no outward appearance betoken other than a sound limb, it is not often that the parts are really so reinstated as to be equal to continued exertion. It is always, therefore, better, even in the most favourable cases, to give a few weeks rest, using a roller or laced stocking round the part. If the horse can be turned out, it will assist the cure, particularly if alone or with cows. But in less favourable cases, when lameness or induration remain, it will be prudent to stimulate the limb more actively, as detailed for lameness in the shoulder, or by the application of a regular blister, which must be repeated every three weeks until the strength be perfectly restored, and the absorption of the enlargement be complete. The benefit of a long repetition of blistering is often most decided. An apothecary in the neighbourhood where I lived, with whom I was on terms of intimacy, had his only and valuable horse injured by a hasty step on a stone, while playing on the road unridden. The consequence was, some little heat and tumefaction under the knee and some lameness. I directed him to be first confined to the stable, and fomented. In a few days this was changed for a saturnine, and then a more discutient application. He was also bled and physicked, but in three weeks little progress was made, and the lameness, which was never considerable, remained the same, with some heat and very slight tumour, from whence I judged there had been some slight laceration of ligamentous fibre, but not extensive distention of tendons. I now recommended him to be blistered, which was done; but still the amendment was trifling. At the end of two months he was again blistered: it was still the same. A third time he was blistered with but little alteration. I still requested my friend not to despair. He was therefore kept at grass and repeatedly blistered, in all seven times. At the end of six months, and not before, the limb was perfectly restored, and remains sound to the present time: all which I detail merely to shew how necessary it is often to continue the means of cure in obstinate cases sufficiently long.

Blistering is preferable to firing in these cases; for this reason, that we can repeat it as often as we please, and both blistering and firing act in the same way: nor is firing ever to be recommended in these instances, until blistering have been fully tried and failed: then, as a more active blister, it may more actively stimulate the absorbents, as well as, by permanently corrugating the skin, it may become a perpetual bandage to the weakened parts. Elevating the heel by means of a proper shoe, is a very prudent measure in these cases; and the use of a laced stocking or woollen bandage continually, may be also used with advantage.

OVERREACH.

This is usually a blow inflicted on some part of the fore extremity by the hinder one. When it happens that the hinder foot strikes the flexor tendons or back sinews, it produces inflammation and tumour, sometimes of considerable magnitude and consequence. The treatment must be similar to that just described.

RUPTURE OF THE SUSPENSORY LIGAMENTS.

Breaking down is the name given by farriers to this accident, and which now and then happens to young horses in breaking, and more frequently to others in training. It has been usually supposed to arise from a rupture of the flexor tendons themselves, either before or behind; but it is very seldom, indeed, that this accident happens to the horse; the immense strength* of these organs almost prevents the possibility of their rupture; but their connecting and suspending ligaments, and the tendinous thecæ surrounding them, may and are occasionally broken through. The limb, in these cases, betrays the greatest weakness, and the fetlock is brought almost to the ground, but the horse can bend his foot when he raises it; which is not the case when the flexor tendons or back sinews themselves are broken through.

A perfect cure is seldom obtained, but the inflammation should at first be obviated by the former means; the limb should then be elevated, and the heels particularly much raised to relax the parts, when an intermediate substance will be thrown out to unite the interstices of the laceration, after which the limb will regain some of its functions. A laced stocking, or firm bandage, is essentially necessary to be used till some degree of strength is gained in the limb. Firing is sometimes useful, as it applies a permanent bandage to the part.

RUPTURE OF THE FLEXOR TENDON, OR BACK SINEW.

This is a very rare occurrence, but frequently the former injury is mistaken for this: the treatment would differ in no respect from that, except that, in the rupture of the suspensory ligament, the flexion or bending of the limb below the pastern only would be necessary; but here it would be proper to flex the whole limb from the elbow downwards, and to keep it constantly in that state, which could only be effected by slinging the animal, in which case it is probable a tolerable cure might be effected, and probably only; for so few horses can be kept in even moderate quietude by slinging, that it is very seldom we derive the benefit we hope from it.

EXTENSION OF THE LIGAMENTS OF THE FETLOCK JOINT.

A Strain of the Fetlock Joint arises from some injury done to the ligamentous and tendinous connexion of this part, either from long continued exertion or from the effects of more momentary but violent efforts. The effect immediately produced is, considerable inflammation, which produces heat and swelling in the part, accompanied with great lameness, considerable pain, and much tenderness. When it occurs behind, it is often mistaken for common swellings arising from œdema, or what is called want of condition, particularly when the accompaying lameness be not considerable. I have frequently seen a slight strain thus mistaken, from which the horse has continued to be more actively exercised to take down the enlargement; until the increased inflammation thus occasioned has forced the vessels to deposit coagulable lymph, which, becoming organized, could never be removed,

* Two cwt. have been suspended to the tendo perforans without rupturing it.—*Percevall's Lectures*, vol. i, p. 203.

but what is called a *callus* remained ever after. In other instances of similar error, the affection has become increased, until conviction has been forced on the owner by the extreme lameness and misery of the poor beast.

The *Treatment* proper for these cases is the same with that already so fully detailed for other strains.

EXTENSION OF THE LIGAMENTS OF THE COFFIN.

A Strain of the Coffin Joint is not an unusual occurrence; and, like the former, consists of violence applied to the tendinous and ligamentous connexions of this joint. When a horse becomes *suddenly* lame, and attentive examination can discover no injury above, the feet should be closely examined, when it is very probable there will be found in one of them some tenderness, and perhaps swelling, particularly at the back part, towards the upper portions of the heels, and in the hollow of the junction of the little pastern with the coffin. In these strains this part will be more hot than the others, and the horse will express pain when the foot is bent or extended, and he will generally also, though not always, *point* the foot when in the stable, or, as it is expressed, will stand *favouring*.

Treatment.—If the heat be considerable, put the whole foot into a Goulard poultice for three or four days: in very bad cases I have thinned the whole crust of the hoof, and have drawn blood from the toe with advantage. After the heat has in some degree subsided, blister, as a milder treatment will seldom avail here. A fracture of the coffin or navicular bone sometimes also occurs; either of which will produce similar symptoms, but so highly aggravated as to enable the practitioner to form his judgment thereon correctly: add to which, the fractured portions may, by attentive examination, be felt to grate on each other. (See *Fractures.*)

STRAIN *of the* LIGAMENTS *of the* FEMUR, WHIRL, *or* ROUND BONE.

As chestfounder covers all the other defects of the fore limbs, so the lamenesses behind are all referred, by the older farriers, to either a strain of the round bone, or of the stifle, as their fancy leads them to favour the one or the other. Violence may, however, and certainly does, occasionally injure the ligaments of the articulation of the thigh with the pelvis.

The *Treatment*, from the deep situation of the part, must necessarily be attended with some difficulty. It will be proper to foment, or, otherwise, to apply saturnine lotions till the heat be reduced, after which blister actively. It is not improbable that the practice of *pegging*, as performed by older farriers on the shoulder, might here, from the depth of the affection, be a useful stimulant, and may in this case be very properly tried. But, in these instances, the parts some times do not readily reinstate themselves, in which case do not at once fire, but try repeated blistering and rest. A seton, if the blemish be not minded, might be applied opposite the articulation with benefit. As a last resource, fire over the joint in a star-like form: in a few days apply a charge of pitch and crocus metallorum or minium, and turn out for two or three months at least.

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Strain *of the* Ligaments *of the* Patella *or* Stifle Joint.

The ligaments of the patella, or of the articulation between the femur and tibia, called the *stifle*, may be strained, or rather injured, by violence, or by blows. As the former affection may be distinguished by a peculiar *dragging* of the limb; this may be known by the *circular direction* in which the leg is carried, during motion, purposely to avoid flexing the joint, except very violent injury indeed have happened, when the leg is dragged along with great pain and lameness. The heat and tenderness will, however, always serve to guide the practitioner materially in this instance. Sometimes the muscles of the thigh, and not those of the joint, become extended, and produce the lameness; in which case, the tenderness will be found within towards the groin, and not around the patella or stifle. In *treatment*, however, this affection in nowise differs from the former, except that sometimes a rowel withinside the thigh has benefited this, but is inapplicable to the other.

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Curb *or* Extension *of the* Ligaments *of the* Hock.

In compliance with custom, which has usually ranked this disease with exostosis, it was in the former editions placed immediately after Bony Spavin; but it is so very seldom an affection of the bones, that, in systematic arrangement, it ought to find its place among Tendinous and Ligamentary Extension, being in almost every instance the effect of some violence offered to the ligaments of the hock, or of the sheaths of the tendons passing from the hock downwards, as of the flexor perforans. Such violence may be the effect of leaping, rearing, kicking, &c. It is often sudden in its appearance; because, like strains, it is dependent on a sudden effort. A kind of predisposition to curbs from conformation is apparent in horses with *sickle hams* (i. e. distorted). In these instances, all the parts must be constantly on the stretch to establish a perpendicular line of bearing, which this form interrupts.

The lameness arising from curbs is not in general severe: occasionally, however, it may and does prove considerable.

The *Treatment of Curb.*—This must also accord with the general rules established for the cure of other ligamentary extensions or strains, by first allaying the inflammatory symptoms, and then by counter irritants, as blisters, &c., promoting an absorption of the deposit, and a healthy re-establishment of the parts. Firing, though sometimes practised, can be very seldom either necessary or judicious; unless indeed in very old cases, when it may be suspected that exostosis of the calcis has taken place, or that the ligaments are weakened to an extraordinary degree, in which instances, and in which only, is it admissible.

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ANEURISM.

When I published the former edition of the Veterinary Outlines, I had never met with a case of aneurism in the horse; but having since seen one*, and likewise learning from my friend, M. Huzard, that several preparations of aneurismal tumour exist in Continental veterinary cabinets, I am constrained to introduce it. I know of only two English authors who have even mentioned æquine aneurism. The first of whom, Mr. Feron, appears to have given rather a fancied than a real description of it; it being evident that he never saw one. Mr. Percevall, a late writer, speaks more decisively on its occasional existence, from having examined a fine specimen of aneurismal tumour of the thoracic aorta, in the Woolwich Museum, gained from the slaughter house. It is not at all improbable, however, but that many horses which drop down suddenly and die on the spot, die from the rupture of an arterial trunk previously diseased, and not from bursting of the heart from mere mechanical distention: such cases might therefore, on examination, often present aneurisms.

CLASS XV.

OF ENCYSTED TUMOURS.

VARIX, OR BLOOD SPAVIN.

A DISEASED enlargement of the coats of the veins is termed *varix*, but which seldom takes place in the venal tubes of the body of the horse, as his superficial order is comparatively small, and not subjected to such artificial pressure as our own. The only instance common in veterinary surgery is, that termed *blood spavin;* which presents certainly something like a varicosed enlargement of the superficial vein passing over the inside of the hock; which, however, appears by no means a spontaneous disease in the vessel, but originates in an enlargement of a bursal capsule underneath, which, when it is sufficiently prominent to attract notice, is called *bog spavin.* This dilatation being situated immediately under the course of the vein, occasions some obstruction to the passage of the blood, and a consequent dilatation of its coats. Usually, therefore, the dilated capsule is the part to be attended to; but when the vein itself becomes so much enlarged as, by its own pressure, to occasion mischief, it can only be remedied by counterpressure, or by removal. A bandage must be so contrived as to surround and take in the hock generally; but should press on the vein moderately only, or we should increase instead of diminish its disten-

* In 1819, as I was passing over Hounslow Heath, my attention was directed to a country collar-maker, who was preparing to draw away a horse which had dropped down dead suddenly. As I learned that the horse was proceeding slowly when it happened, and was before in apparent health, I felt anxious to examine into the cause of his death. I therefore bribed the man to open him on the spot, when we found the chest filled with blood. After some difficulty from the suffused fluid, I traced a rupture of the anterior aorta, immediately as it is given off from the posterior trunk. The collar-maker becoming impatient, and passengers gathering around, but more particularly as I had no convenient means of carrying it, being on horseback, I neglected saving the aneurismal sac, which I have ever since regretted.

tion by interrupting the passage of blood through it. The bandage may be kept wet with any astringent wash, as an assistant application; but should it still remain so much enlarged, that its existence proves really hurtful, which, however, is very seldom the case, then its removal may be effected by carefully including the *vein*, and the vein alone, above and below the varix with two ligatures. Having done this, the tumour may be opened and the contents evacuated, suffering the remainder to slough away. But it should be remarked that, in five hundred cases of what is called *blood spavin*, it would not, perhaps, in one of them be actually necessary to take up or *bar* the vein, as a farrier would call it. It is infinitely more prudent, in almost every instance, to attempt the reduction of the dilated bursa, or mucous capsule of the hock, which occasions it, as directed under *bog spavin*.

DISEASED ENLARGEMENT OF THE BURSÆ MUCOSÆ, OR, WINDGALLS.

The tendons of those muscles connected to joints have membranous vascular bags attached to their ends, called *bursæ mucosæ*, and which are filled with a mucus to assist the motions of the part. These *mucous capsules* are distributed about all the joints; but, in a *practical* point of view, some are more important than others. The immediate anatomy of these sacs may be learned by referring to *Bursalogy*; and, for an account of individual important *bursa*, see *Description of Anterior and Posterior Extremities*, where they are individually noticed, with a reference to their diseases. It is the morbid enlargement of these mucous bladders that forms the *windgalls* of farriers; but which is a most erroneous appellation, inasmuch as under any increase of size they never contain a particle of air. Throughout the body, there exists a sympathy between the organs, which brings one kind into action to supply the deficiencies and accidental wants of another kind: thus increased exertions in the tendons produce an increased secretion of thus mucus; and this the more, as, by exertion, a greater determination of the blood, from which it is secreted, is occasioned; and thus it is, that *windgalls* are almost the invariable attendant on hard work. While they remain small they can do little mischief, and had much better be let alone; but when they become enormously enlarged, they may produce injurious effects from the unequal pressure they occasion; which, by stimulating the parts around to throw out coagulable lymph, interrupts their motion; and, also, by a sympathetic effect on themselves, their contents become not only increased, but diseased, proving frequently inspissated and thick, by which means the obstruction to motion is still further promoted.

In the Treatment of windgalls we must attend to three particulars; the removal of any diseased alteration they may have occasioned in the neighbouring parts: the removal of their own distention; and the prevention of its recurrence. Stimulating applications are the most likely to produce a removal of any coagulating deposit: these are likewise still more proper, as they will tend to effect a removal of the contents of the windgall itself. The *liquid blister* of the *Mat. Med.*, applied as there recommended, will be a very proper application of this kind. But simply to promote absorption of the contents of the windgall, continued pressure will be found the most convenient and efficacious method. This may be applied by means of a bandage around the enlargement, in the following manner:—A calico or a flannel roller may be prepared, of two, three, or four yards long, according to the part affected, and size of the horse: four inches is a proper width, and, from its superior elasticity, flannel is preferable to calico or linen. In addition to this, be furnished with one or two pads, stuffed with horse hair or other elastic matter. Begin to apply the roller, and, after having made a turn or two below the swelling, place the pad exactly upon the windgall; if in the pasterns, one should of course be placed over each side: continue the roller firmly and evenly over all, and fasten off. It will farther assist if either the pad or roller, or both, are first wetted with any astringent application: nor must it be forgotten, that but little benefit can be expected unless this be continued as a constant application for a considerable time, during the day, when not in exercise. I have pursued this plan, and recommended it with singular success, in cases of bad windgalls, both as a removal, and as a prevention to further increase. A run at grass will commonly remove windgalls, if not callous; but, on a repetition of the original cause (*hard work*), they are sure to return again: indeed, having once existed, they are peculiarly liable again to re-appear; the dilated capsule seldom regains, with its original size, its original strength. When windgalls are very large, and of long continuance, if the blemish be not objected to, firing is perhaps the most effectual means of relief, and the more, as it tends to remove both cause and effect; for its stimulating effects excite the absorbents more actively than any other means; and by its lessening the elasticity of the skin, it becomes a continued support and source of pressure to the distended parts.

I cannot dismiss the subject without warning the junior practitioner never to be incautiously led to puncture a windgall, or to evacuate its contents by caustic, or to dissect it out as recommended by even the best of our old writers, as Osmer, Bracken, &c. &c. Most of those of great bulk and long continuance actually communicate with the cavity of the joints they surround, by rupture or extravasation; and the others are of themselves sufficiently vascular to excite similar effects with open joints, when they are laid open; and even if no mischief followed, no good could result; the cyst would be only momentarily emptied; for its capacity would commonly remain the same, and the exhalent arteries would almost immediately fill it up again. Even in this point of view it is quite useless, therefore; but, in another, it is worse than useless, being never done with impunity, for inflammation of the most serious kind is sure to follow. Horses have even been destroyed by it; and, when the consequences are not fatal, they are still sufficiently serious, by generally ending in anchylosis. Bursal enlargements, or *windgalls*, bear different popular names, according to their situations, and are particularized immediately following; but, in all, the treatment must be *radically* the same.

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Bog Spavin.

This is only a bursal enlargement of the mucous capsules on the inner side of the hock; and is what usually occasions the dilatation of the vein of that part, forming varix, or *blood sparin.* The general treatment of this bursal enlargement is referrible to windgalls. It is only necessary to remark here, that any bandage framed for the hock should allow the point of it to be uncovered; for it is not possible to apply one with sufficient elasticity as to allow the necessary motion without destroying the effect of a bandage.

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Thorough-Pin

Is the farriers' term for the bursal enlargement situated in the upper and back part of the hock, between the tendons of the great flexor of the foot and those of the gemini; and, as it necessarily shews itself on each side, so it is a *thorough-pin.* From the peculiarity of its situation it seldom occasions lameness, unless very large.

The *Treatment* of this must also be the same as that directed for windgalls.

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Capulet *or* Capped Hock.

This arises from a swelling of the mucous capsule that surrounds the insertion of the tendon of the gemini muscles into the point of the calcis or hock. From its situation interfering with none of the moving parts, it is seldom detrimental: it is, however, very unsightly, and sometimes becomes of a great size, particularly when it is occasioned by the practice of kicking; in which cases not only is there an immense increase to secretion, but the integuments also thicken surprisingly. It has been punctured occasionally with success, and the contents have been drawn off by setons; but the inflammation raised has endangered life. Mr. Feron details a case of this kind. It is more prudent to trust to the effects of blistering repeatedly.

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The Elbow

Is also subject to a diseased bursal enlargement, which I have seen of considerable magnitude; and which appears, in some instances, the consequences of blows, and in others to arise from the practice of horses sleeping with their fore legs doubled under them, when the high calkins of their shoes press injuriously these parts. Mr. Feron has met with dropsical swellings containing two quarts, brought on by these means. In one case, such a swelling was tapped four several times, and in all, eight quarts of fluid were evacuated. This was not, however, it is probable, a bursal, but a cellular accumulation, or serious consequences would have resulted from opening so extensive a cavity.

An indurated tumour is likewise sometimes occasioned by the pressure of the heels of the shoe, which the French call *couche en vache.* Sometimes these enlargements are continuous with the integuments; at others they are moveable, and of almost cartilaginous hardness. In the first case, blistering is necessary, and, in the second, the only remedy is to make an opening through the integuments, and dissect out the hardened mass, which is easily effected.

The Knee

Also occasionally presents small bursal dilatations, but which are never found to produce inconvenience.

CLASS XVI.

FRACTURES AND DISLOCATIONS.

WHEN any important bone is fractured in the horse, from the trouble of managing him, the expenses attendant on his keep, and the risk of his future usefulness; attempts are seldom made to *reduce* the fractures, but the animal is usually destroyed. In France, on the contrary, to shew their ingenuity, they attempt the reduction of every broken bone, however difficult. I have now lying before me a treatise written expressly on the treatment of fractures, in the cases which have occurred in the practice of the principal French veterinarians, collected by M. Fromage-Defeugré, and sent to me as a complimentary testimony by its ingenious author*. This little work contains not only ample proofs of the ardour and industry of the French veterinarians; but also very excellent directions for the treatment of the fracture of every individual bone liable to meet with this accident in general cases; as, those of the head, the vertebræ, scapula, humerus, canon, and pasterns; likewise the ribs, sternum, pelvis, femur, patella, tibia, canon, &c.

I have ever been of opinion, that we destroy an immense number of horses with fractured bones that might be saved; and, I believe, it was formerly much more the custom than at present, to attempt the cure of most of these. Under the present improved state of the art, there are probably but few broken bones but what might be again perfectly consolidated by judicious attention; and, particularly, in the event of such an accident happening to a beast of tractable and patient disposition. In some of the fractures of large and important bones, if the horse were of a very quiet disposition, and were closely and compactly littered up, or supported by bales of hay or straw at his sides, so that the idea of restraint was not excited in his mind, a cure would often follow. In some other cases he might be slung; and, in almost all, the cure might at least be attempted.

Nature restores fractured bones in the same manner as she does the soft parts; that is, by inflammation. When a bone is broken, and there is no external wound, it is called *a simple fracture*, in distinction from that producing a wound externally, which is termed a *compound fracture*. In simple fracture, coagulable lymph is thrown out from the ends of the bones, in which vessels first form, and then

* Traité des Fractures dans les Animaux Domestiques; où l'on Rapporte des Exemples de Fractures Guéries aux Os des diverses Parties du Corps des Animaux, dont un très grand Nombre dans le Cheval, et des Observations sur cette Matière, tirées de la Pratique de plus de soixante Hommes de l'Art. Par M. Fromage-Deufeugré. Buc'hoz has also published, Memoires Vétérinaire sur la Manière de réduire les Fractures de Jambe des Chevaux, &c.

deposit ossific matter; this, by consolidating, unites the fractured ends of the bones, and is called the *callus*. But, in compound fracture, the coagula escapes, and the union must be formed by suppuration and granulation: the vessels shooting through which, deposit the ossific matter: thus the same end is brought about, though by a much slower process. In the *Treatment* of fractures, therefore, it is necessary that our ends be directed to assist nature, first, by replacing the divided ends as nearly as possible in their original situation; and, next, that by proper applications we retain them there, till union be effected. It is to be remarked also, that when bones are fractured into numerous fragments, it is often necessary to remove the smaller and useless portions, otherwise the irritation of their sharp ends will occasion an unhealthy inflammation. It is also in such cases prudent, when extreme tumefaction shews the existence of these fragments, to cut down on the fracture, and remove them, before union will commence. We shall now proceed to particularize the several fractures individually.

Fractured Skull.—This injury, though not frequent, may happen from a violent kick or blow on the head. The first thing to be attended to, when a suspicion of this kind is entertained, is that of carefully securing the horse; by which means the nature and extent of the injury may be more readily traced: if any depression of the bones appear, or if there be any doubt relative to it, the scalp should be removed by two cross incisions, when the depressed parts will come into view: those that are loose and detached must be removed, and other portions that are only indented may be raised by any instrument having a firm and safe hold. If this cannot be done without, apply the trepan. When this is effected, the scalp may be drawn together by a stitch or two, but the wound should be by no means exactly closed. No irritating dressings should be applied, but the part simply kept from the external air; and if much blood was not lost when the accident happened, a considerable bleeding should take place from the jugular, to prevent staggers coming on; and other depleting means must follow.

Fracture of the Zygomatic Arch.—This bony process is liable to fracture from kicks, blows, &c., in which case the broken portions may interfere with the motion of the jaw, and thus starve the horse. In a case, therefore, of this kind it would be prudent, if the fractured ends could not be replaced through the skin, to make an opening and remove the loose portions; for should coagulable lymph become thrown out extensively, the motion of the coronoid or condoloid processes might be interfered with.

Fracture of the Jawbones.—These distressing cases are not unfrequently happening from kicks or other injuries, and the unfortunate animal is almost always destroyed under an apprehension that nothing can be done for him, or that he must be inevitably starved; but which is not always necessary. In jaw fractures, there is frequently a splintering of the bone into fragments, when, the sharp ends irritating the surrounding parts, a vast tumefaction takes place. In such cases we must not hesitate to open the swelling, and remove any such detached portions. It is true, this reduces the case to that of a *compound fracture;* but it is nevertheless, in some instances, absolutely necessary before the remaining parts can be replaced, or a healthy action follow. When it is the posterior or lower jaw that is fractured, it is most fortunate if one branch only be broken; should, however, the injury happen to both, there is still no need to despair. In such case, particularly if the bones be much shattered, both jaws must be actually bandaged together for some time, feeding the horse only by the nose, which is not impracticable, and is greatly assisted by nutritious clysters: but when one side only is fractured, the jaw can be let loose twice or thrice a-day, and the animal suffered to drink and eat, or rather mumble up a mash. In a fracture of the lower jaw, I once succeeded very tolerably by making a strong leather frame that exactly encased the whole jaw, which I made to adhere by means of pitch.

Fracture of the Nose.—From the brutality of drivers, this accident sometimes happens; it is likewise not unfrequently occasioned by kicks from other horses; and I have still more frequently seen the nasal bones extensively fractured from sabre wounds in engagements. Whenever it happens, the bones should be immediately replaced as much in a natural situation as possible, and the external wound carefully closed from the action of the air. In case the fractured parts cannot be replaced by the nostrils, it would be prudent to elevate them by means of an opening made with the trepan: but, in general, the replacement of these bones, when depressed inwardly, as is usually the case, may be effected by means of something introduced up the nostrils wrapped round with tow, linen, or woollen. After which, if necessary, a false nostril of pasteboard, covered with wool or velvet, or one made of stiff leather, &c., might be introduced and kept there.

Fractured Ribs.—Blacksmiths are apt, from the effect of passion, to strike a horse with their shoeing hammer. I have more than once seen a fractured rib from this cruelty. In other ways, also, the ribs may become fractured. If the end of a fractured rib penetrate the cavity of the chest and wound the lungs, there is considerable danger from the hæmorrhage, and also that the air will escape, and, being admitted into the cellular membrane, will form emphysema. The proper treatment is, therefore, immediately to apply a bandage to prevent the air insinuating itself, and which will tend also to bring the rib externally into its place, while the action of the lungs will assist it internally. If, notwithstanding, air escape and enter the skin, which is known by the distention and crackling feel under the hand, evacuate it by small openings made with a lancet.

Fractured Vertebræ.—When horses, according to the phraseology of farriers and horse-dealers, are what is called *broken-backed, chinked in the chine*, or go *german*, derived from a managed gait, there is sometimes a rheumatic affection of the ligaments of the spine, or a forcible extension of them: in others, anchylosis has occurred. But occasionally fracture is present from some violence offered. It sometimes happens to one of the dorsal or lumbar vertebra, either in casting or during the struggles a horse makes to disengage himself, after he is down. (See *Casting.*) As no such accident can happen without the spinal marrow becoming pressed on, so paralysis of the hinder parts follows, and death ensues. It might, as a matter of experiment in these cases, be worth the attempt to cut down on the fracture, and endeavour to remove the loose portions of bone, by which the pressure might be relieved from the spinal cord.

FRACTURED BONES OF THE EXTREMITIES.

In *fractures* of the larger bones of the limbs, the horse is almost always killed, as being supposed incurable, or that, if cured, he would be utterly useless: but not only are many of these cases also curable, as has been occasionally proved, but a horse frequently becomes perfectly useful afterwards; and it is evident that the breed of such an animal at all events, provided it be a mare or stallion, may be made subservient to our purposes.

A fractured Scapula, or shoulder-blade, may be successfully united by slinging, and the judicious application of bandages; but particularly by enveloping the whole part in an adhesive mass, to which some light splints could be attached to the shoulder, and, proceeding downwards, might be fastened around the arm. This plan steadies and supports the limb more than any other. The ingenious French author, already quoted, directs that the whole of the fore parts may be encircled with bandages to keep the injured bones as much as possible in their natural situation. After which, the horse should be gently forced on the opposite side (it would be better to do this first, I should think), and retained there till the cure be effected.

In a case of *Fracture of the Cervix of the Scapula*, the same author informs us a cure was brought about by attaching the lame limb to the well one for forty days. I should suppose that something sufficiently soft and bulky was placed between the fore legs, and that all were then rolled round together; in three months, we are told, the horse walked without lameness.

The *Humerus* is not often fractured. It is very short and thick, and so strong as to be little in danger; but, in such a case, the plan recommended for the cure of the scapula would be here also proper.

The *Cubitus*, or *Arm* as it is called, is rather more frequently fractured, and may be successfully treated as follows:—Having first slung the horse, reduce the fracture; that is, replace the ends of the divided bones in correct opposition to each other. The animal should be so slung that the feet may just rest on the ground, without taking but little of the weight of the body: fasten each foot in its natural situation; that is, in the situation it would of itself fall. Do this by any ingenious means, as hobbles ringed to the pavement or floor; or four strong boots might firmly be attached to the floor, and each leg, being introduced to its appropriate boot, might be firmly laced in. When all is safe, bandage the fractured limb accurately, by making the bandage embrace every part, and strengthen the whole with proper splints. If slinging in this case produced extraordinary efforts, it should not be persisted in, but well bedding up should be preferred. Whenever slinging can be dispensed with, it should, for few horses can be kept very quiet thus suspended; but partial slinging I have often found to be well borne, which is effected by passing a wide sheet under the belly of sufficient strength to support the body, if the horse choose to recline on it, and of sufficient tightness to invite him to it, when he is fatigued. The French method of enveloping both limbs with one bandage, might also be tried in this case.

The *Olecranon*, or *Elbow*, has been fractured by violent efforts of the muscles; but the tendinous attachments render it extremely difficult to apply means to retain it in its situation. It is only by preserving a state of absolute relaxation of the limb that any attempt can have a chance of succeeding.

Fractured Canon.—This bone, when fractured, might be managed in a manner similar to the arm. I have seen it, however, treated successfully without slinging, by a stiff frame of leather resembling splints for human fractures, only more extensively applied. In Blount's Farriery there is a plate representing some ingenious machinery for the cure of these cases. Mr. Bass, V. S., near Barnet, is said to have had several of these cases, which have terminated successfully, by the application of proper splints and bandages, and which instances are now so common, that no practitioner would be warranted in condemning a horse with a simple fracture of one of these bones, unless the fracture were near to or within the capsular ligament; in which case anchylosis, I believe, always takes place in the horse.

Fractures of the Pastern Bones are commonly observed to occur obliquely or longitudinally; and the lesser pastern or coronet more frequently suffers than the large. A bandage carefully applied with splints to steady the limb, and keep it wholly free from motion, would probably, in most cases, secure a union of its divided portions.

Fractures of the Coffin and Navicular Bones.—The coffin bone is very rarely fractured: La Fosse gives, however, some well marked instances, in all which it appeared to occur from some violent action of the muscles upon it, which forcibly pulled it into several pieces. I have seen two or three preserved fractured coffin bones; but I never met with the case in the living subject. M. Huzard directs the foot to be immersed in a mass of pitch and resin, which, he assures us, will effect a cure. But no perfect cure is likely to follow such an accident; neither should the means he recommends be adopted, until the inflammatory symptoms have somewhat ceased.

Fractured Navicular Bone.—This accident, though rare, is, however, more frequent than the fracture of the coffin. La Fosse has very circumstantially described it; Osmer also notices it; and, in later times, Mr. Turner, V. S., has met with it sufficiently often to engage his particular attention, which he does under the name of the navicular disease. The accident is betokened by a considerable and obstinate lameness following an apparently trifling accident. In some cases, however, of navicular lameness, it is not the bone which has become broken, but its ligamentous attachments, which proves equally incurable. Mr. Field has also two preparations of this fracture, as we are informed by Mr. Percevall.

The *Femur* and *Tibia* are likewise occasionally fractured; and though the French authors give us reason to hope for a salutary reunion, and likewise directions for the management; yet I never saw a favourable instance, and I doubt the prudence of the attempt; but all the parts below may be most properly attended to in case of fracture, in the same manner as those of the fore extremities.

Fractures of the prominent portion of the *Ilium*, or *Haunch Bone*, sometimes occur, and, when not connected with injury of the pelvis, usually unites of itself, but not in just opposition from the action of the muscular fibres implanted into it. These cases are called *hipped*, or *let down in the hip*. No treatment can prevent the deformity which is consequent on it.

The *Patella* is likewise occasionally fractured by violent kicks, when the real cause is sometimes passed over, and the lameness and incapability of motion attributed to other causes. The leg in such cases is inert and helpless, and is sure to waste also, from the position and inaction of the muscles. Unfortunately likewise, when it is discovered, from the difficulty of approximating the separated bones, a moderately successful issue is very seldom attained, and, unless the horse be of extreme value, is hardly worth the trial.

DISLOCATIONS OF THE JOINTS.

Nature has so guarded the joints by the great strength of the ligaments and muscles, that luxation seldom happens; and, when it does, counter-extension is the only means by which the bones could be replaced: but, from the immense strength of the muscles, I believe few reductions of dislocated bones have yet taken place in the horse.

Dislocated Patella.—The whirlbone of the farriers is now and then displaced from its socket by kicks, and likewise by being run against by carriages. I once saw it happen in hunting, from the attempts of a horse to gallop through a gate which was falling to, or shutting. It was a distressing sight, from the total helplessness of the limb, which was dragged along the ground, from the incapability of the flexors to act, having lost their point of support. With dexterity and care, the reduction may be effected by first bringing the limb forwards, so as to extend the joint. While this is doing by an assistant, who should also apply one hand to the inner side of the stifle, the operator may, by depressing the outer angle of the patella, and by a sudden elevation of the inner angle, by means of both hands, slip the patella into its socket, the return of which will be heard by its snap. It is said to be very liable to recur, and which could only be prevented, in an instance quoted by Mr. Percevall, by firing, which corrugated the skin, and formed a permanent sustaining bandage.

CLASS XVII.

DISEASES OF THE BONES.

Caries, *or* Mortification.

BONES are subject to inflammation, which terminates, like that of the soft parts, in resolution, suppuration, or in mortification. The living powers of parts are generally proportioned to their vascularity;

thus bones, as having but little blood, are weaker; and their actions, both healthy and unhealthy, are slow; from which they do not readily fall into disease, but, when they do, the morbid action generally produces death in them. A loss of the medium by which bones are covered and partially supported, will also produce mortification: thus, when the periosteum becomes torn off, or otherwise destroyed, the bone under it dies.

Exfoliation.—When death has taken place in a bone, the process of its removal is called exfoliation, and which process is effected by the absorbents; for the dead bone becomes a stimulus to the absorbing vessels belonging to the living bone with which it is in contact, stimulating them to remove as much of the living as formed an union with the dead; by which means the decayed portion, losing its attachment, comes away. In *caries*, therefore, it must be our endeavour to assist this exfoliation by any means that will further stimulate the absorbents of the living part. Sometimes, from an actual want of power, the caries spreads; in which case we must rouse the living bone into greater action by forcible stimulants; as, oil of turpentine, tincture of myrrh and aloes, brandy, or other spirits; but the most effectual mode is, by the application of the actual cautery, in the form of small heated points applied around the outer edge of the decayed part.

Exostosis.

From the unnatural exertions we force horses into, an inflammatory action is induced throughout all the parts concerned in motion, and which action appears in some measure sympathetic, that by its means secretions may be more vigorously performed, and the hard parts increased in their solidity. But all inordinate actions, carried beyond a certain degree, become morbid; and that which under restrictions would tend to strengthen and repair, becomes a source of disease. This happens in the present instance, wherein the bones and their appendages take on *exostosis*, or a diseased increase of bony matter from the effects of ossific inflammation, stimulated to it probably by a sense of weakness from over exertion: the repair is therefore set about in this manner: There are but few of the bones of the body of the horse but have been found subjected to exostosis: as some parts are, however, more prone to it than others, it has given rise to popular terms, as defining exostosis of particular parts. Thus we have splints, bone spavins, ringbones, &c. In human surgery, exostoses appear to have different origins; but in the horse, that which Sir A. Cooper calls the periosteal exostosis is the most common; although I am perfectly convinced, that cases are not wanting of that which he terms the medullary. In the first, the deposit forms between the periosteum and the bone; and in the second, it takes place more internally within the cancelli of the bone itself. In the horse, also, exostosis appears to have an origin unknown, or at least very rare in the human, but which is here sufficiently common. This, instead of commencing within the bones, originates within the ligamentous attachments, not only capsular, but in such as connect the parts generally. By slow inflammation, under certain circumstances, these first become of cartilaginous hardness, and then furnish a nidus for the deposit of ossific matter, and which at length communicates its morbid action to the bones also. These tumours have one remote cause, which is pressure; and one proximate, which is inflammation. According to the observations of Sir A. Cooper, in his admirable Surgical Essays, even the morbid deposit of bone requires, like the original and healthy, its accompanying cartilage, as a nidus for lodgement, for, during the diseased process of periosteal exostosis, cartilage is formed between the bone and its covering, into which the earthy matter is deposited, at the same time that the periosteum itself becomes thickened, while the exostosis becomes cancellated and structural, like the true bone to which it adheres.

That pressure is the common proximate cause of æquine exostosis, many facts testify. In young animals the vessels furnishing the bones are in a state of enlargement and activity, because they have not only to replace the absorbed portion, but they have to secrete for the increased growth and solidity. These vessels are more liable, therefore, to be distended upon any exertion, and hence to fall into *inflammatory* action, from whence bony deposit is formed; and this will take place in such parts as are most subjected to *pressure;* as, on the inside of the canon or shank before, and on the inside of the hock behind, which parts are placed more immediately under the central line of gravitation. In the first they may be occasioned by blows from the opposite foot, or from standing on too great an acclivity in the stable: a very common cause probably arises from reducing the naturally increased height of the inner quarter, which is further done by improperly raising the outer heel of the shoe; from whence a greater proportion of weight is thrown on the inner small metacarpal bone, and which being, by this pressure, in danger of dislocation, occasions bony matter to be thrown out to consolidate its union with the large metacarpal bone or canon, and the matter thus thrown out forms *splint.* When this takes place in the tarsal bones, or those forming the hock, it becomes *bone spavin. Pressure* may also produce exostosis in another manner, which is, by means of the ligaments and tendons, or of the cellular substance around them, which frequently becoming thickened by coagulable lymph, from violent adhesive inflammation following strains, &c., occasion pressure on the bones below, which in process of time will so stimulate the absorbents, that the bone pressed on will be in part removed by their action: therefore, to repair this loss, a greater and morbid deposit is occasioned, and thus exostosis is formed. Bad curbs are instances of this; an incipient curb is usually an affection of the ligaments simply. But it must not be forgotten, however, that the thickening of the ligaments is sometimes the effect of previous exostosis, which, by its rough surface, irritates and inflames them, and sometimes the ossific deposit commences in them. That species of exostosis which is frequent in old horses, seems more the effect of sympathy than of inflammation, or of a sympathetic inflammation: for the absorbents, in the latter periods of life, are in stronger action than the depositing arteries; hence pressure, and perhaps a sense of weakness, easily stimulates them either to take up the articular cartilages of parts particularly exposed to the effects of pressure and exertion; as those of the articulations of the vertebræ, those of the lateral parts of the foot, and some others: the consequence of which will be the deposit of a more solid matter within a new cartilaginous matrix; or the original cartilages may be themselves the nidus for the bony deposit, as we find to be the case with the ligaments sometimes. After which the cartilage may become absorbed, but cannot be itself converted into bone, as is often expressed, but, it is probable, erroneously so. A morbid sympathy appears frequently to pervade other parts than those immediately connected with the bony machine, and which occasions bony deposit in them, as within the coats of the large arteries, in the cartilaginous rings of the trachea, the internal parts of some glands, &c. &c., by which nature appears to endeavour to renovate the constitution, by consolidating the whole mass, and thus warring, as it were, against the universal and inevitable decay of their structure.

The *Cure* of exostosis must consist in whatever stops the disposition to farther deposit, and removes what has been already produced. In the human subject, these effects have been attempted by constitutional means, intended to act on the absorbents generally; but in the horse, these have not been found to answer any end: local means are, therefore, only resorted to in veterinary practice, and which are principally of a stimulating nature, variously modified, as will be seen under the individual diseases occasioned by it.

SPLINT.

Splint or *Splent* is the farriers' term for a species of exostosis* situated upon or about some part of the metacarpal bones, usually commencing in the semi-cartilaginous substance which unites the great and small metacarpals; and much more frequently of the inner than of the outer side. Formerly, when a splint was attached to the superior extremity of the canon near the knee, the older farriers called it *osselet;* and, when two small bony enlargements were found near each other, they then named them *fuzee.* But when, as is most common, there is one osseous tumour at the upper part of the shank, or canon, it is universally known by the name of *splint,* or *splent.* Splints are a very common evil with young horses, but less so among the old, for the reasons before given. It is usual to consider the consequences of a splint as principally dependent on its situation, and this is generally correct; but a splint may probably prove painful, and otherwise injurious, although it do not interfere with any tendon or ligament; for, independent of the increased sensibility of bone itself under inflammation, the periosteum that surrounds it being inelastic, and having no yielding powers, must become stretched and diseased also. Now, though in a natural state its sensibility is but small, yet, under these circumstances, it probably proves considerably so, and hence may become a source of pain to the animal, till it either becomes absorbed, or has burst †.

* Bracken, the father of the English School of Farriery, derives splint from the circumstance of its serving to strengthen the bone, as thin pieces of wood or splints would strengthen other matter.

† Mr. Percevall strongly contends, that the pain experienced in splints is never dependent on the periosteum, or how, asks he, is it that so few splints are accompanied by lameness, and that almost all spavins are? And again, that if the stretched or inflamed periosteum were the seat of pain, would not the division of it immediately give relief? In answer to which, it may be asked, although the

Nevertheless, as the inflammation is seldom very acute, and the increase is generally slow, thereby enabling the periosteum to accommodate itself to the distention; so more generally, when a splent is not situated immediately under a tendon, or contiguous to ligamentary matter, it occasions but little uneasiness, nor does it often lame. But when it is differently placed, and does interfere with the motion of a tendon, or an important ligament, it is easy to conceive that it must then inevitably occasion pain, and produce much lameness; for a ligament so pressed on loses its pliancy, and a tendon passing over a splint must necessarily have inflammation excited on the vascular surface of its theca, which, being stimulated to pour out coagulable lymph between its surface and the tendon, must obstruct the tendinous motions, and, by this means, bring on lameness. The veterinary practitioner should, therefore, in his consideration of the *consequences* in these cases, be guided, in a great measure, by the *situation* of the splint. If placed anteriorly, that is, when it exists at the fore edge of the small metacarpal or splint bone, it is productive of much less injury than when placed at the posterior edge of the same bone. For, as already pointed out, in this latter case, the swelling may press on the ligaments and tendons of the flexors of the limb, which all occupy this backward situation; and it must, therefore, of necessity, raise much inflammation among them. For the same reason also, a splint placed at the lower end of the canon, is still more prejudicial than when situated higher up the leg. All which circumstances are still farther elucidated in pages 121, 315.

It is however necessary to remark, that it is not uncommon to attribute that lameness to a splint which is dependent on other causes; for, as pointed out, this enlargement does not *often* occasion lameness, except situated very unfavourably, or on its first appearance: and it behoves the veterinarian to look well to other probable causes of lameness, before he pronounces on the evil as arising from a splint. It is usual, but not invariable, for every hurtful splint to be attended with some heat and tenderness; and when, as it does occasionally, it excites inflammation in the ligaments and tendons themselves, it loses all its harmless character, and is not hurtful only, *per se*, but becomes a source of additional evil from these aggravations. As the nature of splint is the converting into bone that union of the small with the large metacarpal bone, which was before of a mixed kind, between ligament and cartilage, so it is evident, in this point of view, a splint can never be wholly removed: but from the absorption in the later periods of life being greater than the deposit, so it happens that the *extra depo it* beyond the simple ossific union, and which extra deposit is that which constitutes the bulk of the splint, is removed in old horses, or, as grooms express it, they "wear away." For the same reasons it may, with equal truth, be said, that every old horse dies with splints; for, in almost every instance, the union between these bones consolidates by age, when the stimulus, of necessity, being lost, a hurtful addition to these *natural* splints seldom occurs in them.

division of the periosteum fail to give immediate relief, does it not, in most instances, do it in a little time afterwards? And also are not the most painful splints sometimes situated where they do not interfere with the ligaments, which Mr. P. contends is the seat of the pain?

Treatment of Splints.—Although, as before stated, we cannot restore the cartilaginous union to the bones; yet we can, particularly in the early stages of the disease, promote an absorption of the hurtful and prominent portion of the exostosis, and which is that which forms, in the popular idea, the splint. The appearance of splints, as much as their hurtful consequences, has occasioned so much attempt to remove them. In olden times very rough means were used for this purpose, which sometimes succeeded, but oftener left matters much worse than before. Such were thumping the swelling with a hammer; rubbing it violently with a stick; piercing it with a gimblet, &c. An attempt at removal was also made by dissecting away the ligaments, when, with a mallet and chisel, the prominent part of the exostosis was chipped off. In the last edition of the OUTLINES, I stated, in reference to this method, that when a splint was very prominent, it might very possibly be laid bare and removed by means of a very fine saw. I affect not the spirit of divination, but such a plan will yet be acted on, particularly in exostoses not close to a joint; and I make no doubt advantageously, being first perfected in the great emporium of the healing art, human surgery. For, since those pages were composed, numerous successful experiments have been made on human exostoses, and orbicular saws have been invented for cutting away bony tumours, at any depth, without endangering the other parts: and we have the high authority of Sir Astley Cooper for stating, "that there is reason to believe that these structures may, with properly constructed instruments, become much more the subject of operations, than they have hitherto been considered."

Pressure, by means of lead, &c. &c., is an invention also of antient date; and is even yet practised. Blistering and firing are also very old remedies; while "sweating" with oil of origanum, and other essential oils, is of patriarchal extraction, and if not superseded by mechanical removal, will probably last to the end of time. It has lately been the practice to substitute setons for blisters; but these do but half the work of blisters in twice the time, and do they not leave a blemish into the bargain? It is but justice, however, to add, that they have succeeded, particularly in spavins, where all other remedies had failed. At the Veterinary College, it has likewise been common to divide the periosteum over the splint, by which much relief has been obtained. It is, however, seldom necessary to have recourse to other means than vesication, which if persisted in by first actively blistering, and then keeping up an irritation by milder means (as blistering ointment one part, lard three parts), for three or four, or even more weeks, will generally complete all that can be effected. Or one active blister may be followed up by another, with intervals of a week between. In some few cases, where the ligaments are identified with the exostosis into one tumid mass, it is necessary to apply the highest stimulus which we know, which is firing in the lozenge form; and the fired part may, if thought fit, be blistered immediately.

BONY SPAVIN.

THIS is also an exostosis, whose existence is very prejudicial to the value of the horse. Its seat is usually on the inner side of the hock, either upon the cuneiform tarsal bones, or at the upper extremities of the large and small metatarsals. Both in cause and effect, it presents probably but little difference from a splint. Its origin may be attributed, like that of splint, to inflammation, first, probably originating in the humerus and complex ligaments of the hock, or in that semi-cartilaginous union between the inner small and the great metatarsal bones, and is probably more immediately the consequence of violent exertions, than of central pressure, but which also may have its share. These effects weaken the structure of these parts, and not only irritate them into diseased action, but also transmit the evil to the bones, and produce exostoses in them. As this osseous inflammation proceeds, an union of some of the tarsal bones takes place, whereby the elasticity of the mechanism of the hock becomes injured, and lameness ensues. The lameness, however, it is probable, is also equally or more the effect of the same circumstances as operate in producing lameness in splint; namely, the painful interference these bony enlargements offer to parts in motion over each other. For the before-mentioned reasons, as splint is more usual among young horses, so spavin is more frequent among older ones. A *spavin*, or *jack*, as it is sometimes called, will often lame when outwardly small; but, in such case, the exostosis is probably greater within: and, on the contrary, sometimes a very considerable enlargement produces comparatively little mischief. Unless very deep seated, or very large, the stiffness and lameness occasioned by a spavin go off by exercise, which will serve to distinguish it from other affections; and, even when the lameness remains permanent, still it is much more painful at first than after a little motion. The reasons for which appear to be, that the ligaments, both capsular and other, which are kept in a continued state of irritation and tumefaction by the morbid ossific inflammation by exercise, lose some of their irritability, and gain pliancy as they proceed. A spavin of the cuneiform bones usually lames more than that which is lower down and affects the metatarsals only. Neither do spavins, when arrived at a certain state, usually increase; consequently spavined horses for some purposes may prove very useful. Post-masters and stage-coach drivers are not however very willing to purchase these, or any others, with permanent lamenesses *behind*, though they do not object to those which are lame *before* with founder. The reason of which is, that, in lamenesses in the hind extremities, horses, from instinctive fear, are unwilling to lie down; but, when lame *before*, they are not impressed with this dread; for a horse makes his principal effort to rise from behind. Impelled, therefore, by pain, a foundered horse readily lies down, and these persons find, by experience, that the horse who lies most can work most.

Treatment of Bone Spavin.—This does not differ from that of splint, except that, as it is much oftener a cause of serious lameness, and occurring as it commonly does in older horses, from the effect of long-continued exertion, so it also proves more obstinate; and the treatment required, therefore, should be more active. Among the older farriers, who, like some of the moderns, think nothing too strong for a horse, violent mechanical operations were resorted to, to remove spavins, as well as splints; as the mallet and chisel to chip it off, boring the exostosis with a gimblet, punching it with a hot iron, or applying caustics; the first removing it mechanically, and the three latter methods destroying its vitality and promoting its exfoliation. But, as might be expected, for one case which succeeded, twenty increased the lameness, or ended in anchylosis, and sometimes in death. But the very few successful cases gained by these violent means, still give the practitioner without professional character a decided advantage over the regular veterinarian; for should the former, by these violent means, destroy his patient, he only stands where he did; but if he cure him, all the world is told that he has effected that which the veterinarian could not do; that is, what he dare not attempt. As with splint, it is not improbable that instruments may yet be devised which will operate on these bony enlargements without risk; though the chances are fewer in the hock, from its connexion with capsular and bursal ligaments, than in the fore leg. The *treatment* pursued by veterinarians of the present day varies somewhat; those bordering on the old school, still rub them with some violence, and then stimulate them with ol origanum, ol terebinth, &c. &c. Those of later date blister and fire. At the Veterinary College setons are used, by nipping up the skin and pushing a seton needle armed with tape through it, so that the tape within the skin exactly opposes itself to the spavin. If the skin be tender or tumefied, it is more proper to make an opening above and below the exostosis, and to push a *blunt* seton needle, or eyed probe, from one opening to the other, armed with the tape, which should be daily smeared with mild blistering ointment, or common turpentine. In this way, report says, the College practice has proved very successful, and therefore merits trial. Blistering I have, however, found, when repeated over and over, and particularly when mild intermediate stimulants have been kept applied, as a weak ointment of Spanish flies, or oil and turpentine, &c., has commonly proved equal to all the benefit these obstinate cases can receive; for when the bony deposit is fully formed, it is in vain to expect its entire absorption: even its partial absorption is often frustrated. Our principal hope lies in removing that inflammation which is the existing cause of much of the pain, stiffness, and tumefaction in the ligaments around, and likewise in preventing the increase of the bony deposit. Our hopes of success must also greatly depend on the time of the existence of the evil. When it is early attended to, before the bony deposit has gained its full solidity, stimulants act more favourably, and lessen it more materially. It remains to add, that, when repeated blistering fails, the more active method of promoting absorption by firing may be tried, carefully avoiding to fire too actively or deeply, otherwise the integuments may be penetrated, and a dangerous inflammation and sloughing of the ligaments follow.

CURB.

It has been so long the custom to rank curb with exostosis, that in the former editions I yielded to it, and entered on the description and treatment of it in this place. Curb is, however, so very seldom accompanied with any bony affection; and when it is so, the *treatment* does not materially vary; that it is now treated of among ligamentary and tendinous extension, to which it properly belongs.

A RING-BONE.

This is usually an exostosis surrounding the whole, or part, of the circle of the coronet. Sometimes there are only two lateral swellings; but, although the situation is no further varied than this, in the different cases which occur; yet the parts affected are very dissimilar, and the degrees of lameness by no means the same. In very upright pasterns, either such as are naturally so, or become so from hard work or from high-contracted heels, the bones are so perpendicularly opposed to each other, that great jar is sustained during the motion, and inflammation is either excited in the ligaments, cartilages, or bones themselves; by which an osseous deposit takes place, either around the coronary ligament, or around the extremities of one or both pastern bones. When the deposit takes place within the lateral cartilages, the prominence is not circular, but on each side of the foot; and these cases, which are common to aged and hard worked horses, are not in general attended with so much heat and lameness as those which extend around the coronet, and have the pastern bones or coronary ligament for their seat. *Ring-bones* are not uncommon among colts at the time of their backing, from the ruinous weights of a heavy rider, over rough or ploughed ground, and from their being thrown on their haunches during their training, and which effort is, perhaps, the reason that they are more common to the hind than to the fore feet.

The *Treatment* of a ring-bone resolves itself into attempts to reduce any considerable inflammation which may exist by bleeding at the toe, and a poultice with bran and vinegar applied around the foot two or three weeks, until active inflammation be abated. After this blister the coronet, and keep up the inflammatory action of the blister for a month. If the ring-bone be still in the same state after this period, proceed to fire, and again blister over it.

Exostoses of the Coffin and Navicular Bones are still more common; indeed, the coffin bones of old horses are seldom seen without them: it is equally common to see the lateral cartilages absorbed, and their place supplied by bone. It is curious to observe the vast varieties in these deposits; in some, the coffin is increased to a grotesque form, totally distinct from the original. In some few, the absorption is greater than the deposit, but this is not frequent. The navicular bone becomes sometimes incrusted also with osseous matter, and the sensible laminæ do not escape a similar incrustation. Can we, therefore, wonder at the stiffness and disinclination to unusual exertion in old horses? or can we be surprised that these affections are so irremediable in them?

ANCHYLOSIS.

When ossific matter is deposited within or upon the extremities of bones, or within or upon the capsular and investing ligaments, so as totally to destroy the flexibility of a joint, it is called *anchylosis*. This tendency is manifested in a very great degree in the horse, as might be expected, from his being so subjected to continued and violent exertions, tending to put all the parts on the stretch, and, by the stimulus of exertion, to press all their powers of the parts to the top of their action. Few of the joints of the horse escape the chance of anchylosis, as few of his bones are out of the ordinary reach of exostosis. The joints of the spinal column, particularly of the dorsal and lumbar vertebræ, are very frequently the seat of these affections, which seem to be occasioned by the heavy weights imposed on these animals. It is this affection which renders old horses stiff, and in some instances unwilling to lie down, or when down to rise up again. (See *Osteology.*)

Anchylosis of the knee and hock is likewise not uncommon from punctures into the cavity of the joint, either by accident, or by the lamentable ignorance in the treatment of their medical, or rather non-medical attendants.

Anchylosis of the Pastern Joints is also not unusual. One cause appears to be ulceration of the articular cartilages. (See the *Groggy Affection.*) Another is the inflammation of the ligaments, from an unfavourable opposition of the bones of the pasterns, gained either by excess of exertion, and then called knuckling, or by that malconformation called upright pasterns. In these cases the tendons and ligaments are ever on the stretch, to rectify the unnatural line of the limb, and to prevent the shocks of concussion, which eventually terminates in a deposit of ossific matter in and around them; this soon communicates to the bones, and these joints become finally anchylosed.

From what has already been said, it will be evident that no *treatment* will be effective in promoting a perfect cure in any of these instances; we can only palliate the symptoms by the means before detailed in Exostosis.

CLASS XVIII.

DISEASES OF THE EYE.

INFLAMMATION OF THE EYE.

Ophthalmia Membranarum.] [Inflammation de la Conjonctive.

IT is very remarkable, that though the diseases of the human eye are estimated at more than a hundred, yet there is one only very common to the horse; but which, in obstinacy and ill effects, more than equals all the human catalogue: this is the ophthalmia membranarum, by farriers termed *moon blindness*, or *lunatic*. The ophthalmia tarsi finds no place in the diseases of the horse. The *ophthalmia membranarum* is a *specific* and a *constitutional* inflammation of the coats of the eye, and, as such, it requires probably a complete alteration in the constitution for its cure, which will serve to account for the difficulty attending it. The present Professor of the Veterinary College paid a very early and minute attention to this subject; but the result of his researches has only tended to confirm the character of its obstinacy, and of its fatality to the organs it affects. It is remarkable how uninformed the older writers were on this subject; and some of the moderns have little to boast of on this head. The attendant appearance and a slight enlargement of the *haw*, which are only effects of the disease, have been continued to be regarded as at least adding to the complaint, and very often, even now, they are thought to occasion it; thus writings of modern date still contain directions to remove it in these cases. Nor were the former Continental writers much better informed on the subject; their descriptions of the affections of the eye being mostly drawn from treatises on human diseases, and hence they have introduced complaints never met with in the horse. The French writers of the present day are better acquainted with this disease, but equally lament with us its obstinacy; both which, and its frequency, appear to be greater in some provinces than in others. But throughout the country generally, it is sufficiently destructive; so much so, that the Royal Agricultural Society of France have offered 1200 francs for the best dissertation on it.

One general error has attended the consideration of this disease, which has arisen from neglecting to regard it as a *specific* affection; on the contrary, farriers and grooms have usually attributed it to the effect of accident, and, therefore, viewed it as simple inflammation: whereas the inflammatory affections consequent to violence seldom produce any ill effect, and in fact are removed very easily. The practice pursued in these cases has likewise been very improper; for it has been supposed that the accompanying *opacity* is brought on by a membranous film, distinct from, and foreign to, the eye; and hence abrading substances have been universally used: but even when they did good, it was not from their *scouring* quality, but from the stimulus applied to the absorbents, which sometimes by this means removed the coagulable lymph that obstructed the transparency.

The *Symptoms* are not invariably the same in every instance; some appearances are, however, constant and universally characteristic. In its *active state*, it produces the following:—swelled eyelids, which appear nearly closed over a sunken retracted eyeball, giving the eye the appearance of being diminished. This arises from the retractor muscles acting to withdraw the eye from the stimulus of light, which appears in every case of active inflammation to give extreme pain. This retraction of the eye inwards, forces the haw over a portion of its globe, where it is seen swelled and preternaturally red, from its participation in the disease: and which addition to its size and colour, have, among farriers and horsemen, long subjected it to the accusation of being the cause, instead of the effect, of the disease. The eyelids, if everted, will be found highly vascular and hot, pouring forth, in most instances, a flood of tears, which continually trickles down the face in successional scalding drops. The globe of the eye, in this active inflammatory kind, will present a net-work of turgid red vessels over its opaque, and at other times white surface: and such is the distention of the blood vessels, before intended to carry only the colourless parts of the blood, that they not only impinge the opaque cornea, but are seen obtruding their red lines into the transparent cornea also, producing that appearance denominated *bloodshot*. Not only does the exterior surface of the globe present this discolouration, but the humours also, or the internal parts seen through the opening of the pupil, appear unusually turbid and muddy. This appearance is dependent equally on distention of the vessels carrying that part of the blood which is called colourless, but which is not strictly without colour, but apparent only, from the extreme minuteness of its column. When, therefore, such column is enlarged by inflammation it loses its transparency, and, from the multiplicity of these distended tubes, the otherwise transparent humours look cloudy. In certain stages of the complaint, or under a very aggravated form, these vessels are still further distended, and they may even deposit coagulable lymph, when the eye presents opacity over its whole surface, and within the humours also. This transition, from a simple dimness in the appearance to a perfect opacity, sometimes takes place with a remarkable quickness, and its return to its former state will oftentimes be as rapid. I have seen an eye perfectly opaque within and without, which was merely dim the night before; and perhaps, within twelve hours, it will be the same again, without any apparent medical or natural cause. This extreme activity of both the depositing and the absorbing vessels is peculiar to the brute eye; in the human these changes are less rapid, which has been attributed to the coagulable lymph in the human eye rupturing its minute vessels and becoming extravasated; but in the brute eye, to its remaining within its vessels. This, however, cannot be the cause, since, from our present physiological theory, it is natural to suppose that a fluid must be extravasated, before it can be absorbed; consequently it would disappear, under this view of the matter, quickest in the human subject. It is really dependent on the greater energy of the absorbing system of the horse under the inflammatory action in these cases.

In the above detail of symptoms, the active inflammatory state has been described, and which is frequently so sudden in its attack as to gain almost its maximum in a few hours, which has led inexperienced persons to look for the cause in blows, irritating matter falling into the eye, as hay seeds, stings of wasps, bees, &c. But it is neither in every instance thus violent, nor thus sudden; on the contrary, it sometimes approaches more slowly, when the impatience of light is not remarkable, and amounts only to a winking of the lids, and moisture from tears, when brought into the full glare: the globe of the eye looks rather yellow than red, and within it is only slightly disturbed with a discoloured muddiness. The haw is here hardly apparent, the eyelids are less swollen and gorged, and the tears pass in their natural channel; the eye or eyes remain without much variation many days, and sometimes weeks even. This apparent mildness of symptoms is not, however, a prognostic of a less formidable disease, for this proves usually as obstinate and as eventually fatal to vision as the other. Among the other peculiarities between ophthalmia of the human and of the horse, one is, that it usually attacks both eyes in the former, whereas it is by no means unusual for it to attack one only in the horse, leaving the other totally unaffected, or at most only sympathetically so, but without specific affection. Equally worthy of remark, is the complete and sudden metastasis, which often takes place in this monocular ophthalmia. From being in a very aggravated state of inflammation in one eye, it will suddenly shift its seat to the other, leaving the original much amended or nearly well. This complete metastasis has caused the æquine ophthalmic disease to be compared to a *gouty* affection; and it certainly fully establishes its character as a *specific* disease. It is this shifting of situation also that has given rise to the custom of putting one eye out by violence, with a view to save the other. It has been observed, that when the disease is attended with tumefied lids and much weeping, it usually attacks both eyes, but I have not unfrequently seen it confined to one only. It is also asserted, that under ophthalmia a horse rarely sweats, and that when he does it is not a favourable perspiration, but a cold clammy one. I have not observed this as by any means a general fact; but there certainly in these cases is an evident sympathetic connection between the eyes and skin; which latter is often harsh, and produces a strong coat in ophthalmia.

Another distinguishing peculiarity in this complaint is that there is almost a certainty of a recurrence of its attacks at indefinite periods, which the older farriers usually estimated at about a lunar month; and hence supposed that the moon had some influence on it; and therefore named it *lunatic* or *moon blindness*. It is justly observed by the French nosologists, that *periodical* ophthalmia would be a more proper term: since it is evident the moon's increase or wane has nothing to do with it, for it recurs at periods from two or three weeks, to as many months. It is seen, however, that the first of these inflammatory attacks however violent, having arrived at its height, usually gives way to medical treatment, or the disease leaves the horse of its own accord, and the eyes recover nearly their former appearance: but they are seldom so perfectly transparent as before; for, on a narrow inspection, there will be observed either some small opaque spots within the pupil, or the general cornea will not be so distinctly clear as before; or even should the centre of the cornea be perfectly transparent, yet there will commonly remain some cloudy lines around its extreme circumference. This latter appearance should always be particularly attended to, for this is the very last part the opacity quits: and, I believe, in an eye once affected, *this* hardly ever wholly leaves the extreme edges. The eye or eyes, however, *thus* recovered, seldom remain very long sound, but something again calls the deseased action forth, and the complaint recurs with its former violence and its former appearances. As these attacks are repeated, they leave the eye less transparent each time; sometimes a very small white speck is left within the humours, which may be seen through the pupil. This opaque spot forms a nucleus for the growth of future cataract, by gradually increasing: sometimes, however, it will remain stationary a great length of time, and now and then it never enlarges. But in general, repeated inflammatory attacks succeed to each other, and the whole crystalline lens at last becomes opaque, when the disease takes the name of *cataract*, in which almost all these inflammations terminate. It is remarkable, likewise, that when the process of forming cataract is become fixed and regular within the crystalline, that active inflammation usually leaves the coats of the eye, and seldom again returns.

Causes.—It has been conjectured, that the *remote* cause of this disease arises from the plethora, which takes place in horses at the adult period: that is, when they have just attained their growth: at which time it is observed they are more frequently first attacked with the complaint; for till this age the blood has not only to nourish the body, but to increase it also by the addition of parts; but after maturity, having only to support the organs it has already formed, there must be a superabundant quantity of it circulating through the machine: at this period, likewise, the arterial system is in a state of increase generally, and consequently subject to distention. This theory, however, though ingenious, is by no means sufficient to account for the constitutional tendency observed to it; for it is by no means confined to the adult period; and even barring this objection to its correctness, it yet remains to be accounted for, why the eyes should be, of all the organs, the only ones attacked, seeing the plethora is universally distributed; and why also the complaint should be confined to the horse, and not take place in any thing like an equal degree in the mule and ass, at their adult periods, even in those countries where the treatment of them is equally luxurious with that of the horse. We must, therefore, for the present content ourselves by considering it as a constitutional liability, dependent on some peculiarity in the system, which certainly appears to be greater at this period than at any other, but which is by no means invariably confined to it. At the same time we may indulge a hope, that a more intimate acquaintance with the animal functions, and with the anatomy of the head, may, hereafter, enable us to discover the source from whence these organs draw this liability. The *occasional* causes are probably various. A determination to the head must be the consequence of the exertion which a horse is exposed to when he is first put to active and laborious exercise, particularly that of drawing; and this, as he is unused to it, must act considerably in distending these parts. Colour has been thought to influence the disease; but there needs no other proof that this is incorrect, than that no two persons agree as to the shade most obnoxious to it; neither is any particular kind of horse more exempted from it than others: but size has certainly some connexion with it, as blindness is much more rare with ponies than with large horses. The acrimonious fumes of a hot foul stable to a young animal, that has been only used to a barn and paddock, may very readily call forth the liability into action likewise: and it is not improbable, as we have before said, that this is a very frequent cause*: though as farmers' horses and others, who are more naturally treated, still are subjected to it; so this cannot wholly account for the disposition. Nor are mules, asses, and stall-fed cattle, however closely confined, often attacked by it. There is no doubt also but accidental plethora at any time predisposes to it; and likewise inflammatory affections of other organs may, by trans-

* Does the late prevalence of the Egyptian ophthalmia throw any light on the subject of our present inquiry? The great frequency of the disease in that country is very generally attributed to acrid particles generated by the recession of the Nile; and probably as much also by the acrid burning dust continually flying in the air of that fiery region. If this be the case, the gaseous effluvia, generated by crowded and foul stables, may be a more universal cause of the ophthalmia of the horse than is generally imagined: and from this error in natural treatment, even farmers and others are not exempt, who, when they do stable their horses, certainly often crowd them, and as often suffer them to stand on foul litter.

lation, prove a cause: and cold applied in any way frequently calls the disposition into action.

Treatment.—It is not in general found difficult to remove the immediate attack; but from the specific nature of the disease, and the connexion it has with the constitution at large, it is extremely difficult to prevent the recurrence. Common farriers attempt its present removal, and usually go no further. More scientific practitioners mitigate the urgent symptoms, and then attempt to attack the cause, through the medium of the constitution at large; though it must be owned, in general cases, their efforts are attended with very dubious success. The *treatment* should be always commenced by general and copious bloodletting, except in cases of much emaciation, when it should be confined to topical bleeding only. The general bleeding in a full plethoric horse may also be repeated once or twice afterwards: but when there is no existing plethora, I have not found a frequent repetition of general bleeding advance the cure. Topical evacuation of the blood may be attempted under every state of the body, and may be continued as long as any *active* inflammation exists: but cases will often occur when no benefit appears to result from even this. It is common both to practise and to recommend a division of, or a bleeding from, the temporal artery as a more than usually effective remedy; but I have already been at some pains to point out the error of such recommendation, seeing this artery is not distributed to the eye, but is wholly spent on the masseter muscle. (See *Angiology*, page 147; see also *Plate of general Splanchnology, where the distribution of this vessel is particularly and purposely traced.*) Topical bleeding, however, intended to unload the vessels of the eye, can be effected from a small venal ramus which enters the inner canthus of the eye; or still more favourably by a division of the very fine vessels of the conjunctiva; which, in these cases, may be always seen turgid and full of blood around what is called the white of the eye, as well as within the lids. It requires only moderate dexterity to do this; for if the horse be firmly twitched by the nose, the eyelids being elevated by one hand, with the other these vessels may be readily divided by means of a small scalpel, lancet, or very fine scissars. I have now and then scarified the inner surface of the eyelids in preference, and have sometimes thought I gained more benefit from it. Considerable amendment has also followed the use of setons placed as near the eye as possible. In some instances they have been passed through the under part of the conjunctive coat; but I am not aware that any greater advantage has resulted from this mode, in preference to placing them in the integuments just below the eye. The general objection to setons here, is, that they leave a blemish; but by the use of a small seton needle (see *Instruments*) this is rendered very trifling. Rowels under the throat are, however, not liable to this objection, and, as being a much larger drain, probably act with more advantage. I have occasionally tried them with evident benefit; and as they are not likely to be rubbed out by the horse, so, in many cases, they are to be preferred. I have also blistered the cheeks with success; but much caution is requisite to prevent the blistering matter from being rubbed into the eye itself: it may, however, be done in the following manner:—Spread over a piece of stout but pliant leather, the size of the palm of the hand, a thick margin of cobbler's wax, an inch in breadth, which will leave a central part bare; over this place some stiff blister plaister, such as is used for human blisters, which is much firmer than that made by the veterinarian. Apply this, a little warmed, three inches below and behind the eye; afterwards carefully tie the head up by each side, when no danger can occur.

The *external applications* proper in these cases are next to be pointed out; previous to which, however, it must be remarked, that the inflammation present does not, in all instances, bear the same character; but in some is accompanied with a higher degree of irritability than in others. For in some cases mildly stimulating applications agree best, as vitriolic solutions, tincture of opium, diluted æther, diluted brandy, saline washes, &c.: but at other times, and that more frequently, weak solutions of the superacetate of lead are best borne, and relieve most. In these cases of high irritation, poultices may be applied. I have experienced the utmost benefit from scraped carrots or turnips, and in one instance the common houseleek also was applied beneficially in this way: the most common poultices, however, are the saturnine, which may be very properly and very generally tried. But, owing to the irritability of the animal, it is often found difficult to retain a poultice: in every case, however, an apparatus of folded linen, wetted with the Goulard water or other wash, may be kept on with ease. Soft linen cloth, several times doubled, may be used for this purpose, fastened to the headstall from the ear of the affected side, as far as the centre of the collar front, hanging from this down the middle of the face over the affected eye, and then secured across by tape. This will have the double advantage, of shielding the eye from light, which is always desirable, and of keeping the medicaments constantly applied. The following formulæ will be found a good one for the early states of the complaint; but, when the irritability is extreme, omit the vinegar*:—

No 1.—Superacetate *(sugar of lead)*	one dram
Rose water	four ounces
Vinegar	half an ounce
Soft water	a pint.

Internal medicines ought next to occupy our attention. In every instance, if the horse be tolerably full of condition, debar him from corn; instead of which give bran mashes: and, if it can be procured, green meat instead of hay; if not, give carrots, which will support the condition without heating. Every thing that requires active chewing must necessarily force much blood to the head, and, therefore, should be avoided. Some practitioners prefer *diuretics* in these cases; some *purge;* and others trust principally to *alteratives*. I have generally found it beneficial to direct two doses of physic, and to give alteratives in the meantime. And as there are frequent rigors in some cases, and in all the skin is unthrifty, so warm clothing is advisable: and, as a farther assistant towards a determination to the skin, unite calomel, tartarised antimony, and nitre, as the alterative used.

* I remember to have been induced to try warm fomentations to one case, from its extreme obstinacy. The amendment was striking. I afterwards tried it on others with variable success.

Carefully avoid every source of unhealthy irritation from dung, urine, or stables not ventilated. Exercise, for the first few days, had better be omitted, and afterwards it must not be allowed when the wind is high, or the air cold.

In a week or ten days from the first attack, it may be expected that, *by these means*, the extreme irritation of the affection may have given way, when any of the following formulæ may be tried; for it may be remarked that, in three cases, all appearing alike, it is not uncommon to find each require a different application. The prudent veterinarian will, therefore, vary them until the benefit from one shall be evident:—

No. 2.	Superacetate *(sugar of lead)*	one dram
	Sulphate of zinc *(white vitriol)*	two scruples
	Water	a pint.
No. 3.	Muriate of ammonia *(crude sal ammoniac)*	two drams
	Vinegar	two ounces
	Infusion of red rose leaves	a pint.
No. 4.	Brandy	one ounce
	Vinegar	one ounce
	Tincture of opium	two drams
	Rose water	eight ounces.
No. 5.	Æther	half an ounce
	Infusion of oak bark	six ounces.
No. 6.	Rose water	six ounces
	Mindererus's spirit (see *Mat. Med.*)	three ounces.

Introduce any of these, by means of a small piece of sponge or rag, within the inner angle of the eye, gently pressing in a little, which the action of the nictating membrane. or haw, will soon carry over the surface. Various other applications have been used besides those enumerated, all with dubious *permanent* benefit, but many with present advantage. Among them may be noticed an infusion of deadly nightshade, which, from its wonderful properties of apparently paralyzing the iris, was supposed cppable of arresting the inflammatory action: but the event has not justified the expectation. Had it proved otherwise, it would have formed a most convenient application, as it will produce its effects by absorption without actual introduction to the eye; consequently an ointment rubbed on the temple would, in such case, have been sufficient. The cajeput oil has been also tried with some benefit. Gall, common salt, watery solutions of opium, of aloes, and of ground ivy also, have all of them had their advocates.

The *mechanical means* used as remedies in this complaint have also been varions. The removal of a part or of the whole of the haw has been practised under the most erroneous view of the matter: nevertheless the bleeding and irritation consequent to such an operation, have sometimes proved somewhat beneficial, and have thus served to perpetuate the barbarism. Taking up the carotid artery on the affected side has also been tried, under an idea of lessening the arterial determination to the head. It has, however, failed in affording relief, and is altogether an ineligible practice. The temporal and angular arteries have been also taken up. Neither have the veins escaped, but several have been divided experimentally, and all with equal want of permanent success. The destruction of one eye has also been practised with lasting benefit to the remaining eye; and this in so many instances, that it in a degree blunts the natural repugnance to its apparent brutality and violence. The benefits resulting from it are founded on a law in the animal economy, that where organs are double, as the eyes, ears, &c., the loss of one is sure to throw additional strength into the other. In correspondence with this view, it had been long observed that after both eyes had been affected, if the disease became permanent in one, that as soon as it assumed this character the other eye recovered its remaining affection; it has, therefore, been a practice with some farriers to put out the worst of the two affected eyes, for the purpose of saving one. If this should ever become general, it is evident it can only be successful before any considerable disorganization has proceeded in the eye attempted to be saved. The operation may be performed by introducing a couching needle within the globe, and by breaking down its texture to excite suppuration. Totally destroying all structural function in the diseased eye would probably be necessary to excite in the other the sympathy of necessity requisite to ensure its future health.

To pursue the disease, it may be remarked, that consequences *follow* the active inflammatory attacks, which have also occasioned attempts to combat them in particular. The principal of these is the opacity of the transparent cornea, in either the form of one or more specks; or otherwise of a general pervading film, for the removal of which mechanical friction has been very generally practised by means of rough substances, as powdered glass, powdered tutty, charcoal, &c. &c. But it should be remembered that this opacity is not confined to the outer surface of the cornea, but pervades its whole substance likewise, so that, when such applications do any good, it is not by mechanical abrasion, but by stimulating the absorbents to remove the coagulable lymph, which forms the obstructing matter. This being the case, other substances may be found more efficacious than those that are simply abrasive and rough. Calomel, acetate of lead, a mixture of chalk and powdered alum, or of white vitriol, calamine and tutty, &c. have been all used for this purpose. These matters may be introduced by placing a little of the powder within the inner angle by the help of the fingers, leaving it to be carried over the eye by the action of the haw: but it is not prudent to blow in any powder by means of a quill, as is frequently done, for it alarms the horse, and is apt to make him shy about the head ever after.

In some instances, when the disease has been thus far removed, I have recommended turning out to grass for a considerable time, and it has seemed as though the constitutional tendency has been removed by it, for it has never returned. In other cases it has again appeared; nor do I think turning out proper, so long as the slightest degree of inflammation lasts, although even here it has done good. In other cases I have seen it hasten the fatal termination into cataract. When it has once occurred in young draught horses, from the increased tendency such work has to force blood to the head, I have always recommended that such horses be afterwards used only for the saddle, and this sometimes with apparent advantage. In other cases, the recurrence appeared to be prevented by permitting horses, which were otherwise constantly in use, to lie without doors every night, and I have my doubts whether this might not be often practised with more advantage than any other plan. Mercurial courses, occasional physic, periodical bleedings, and often repeated alteratives, have all been tried, but have too frequently failed. Nevertheless it is left to the discretionary judgment of the veterinarian to determine which means to adopt, seeing all have occasionally evinced some preventive efficacy.

CATARACT.

The specific ophthalmia just described has too common a tendency to terminate in *cataract;* which as it never appears, as in the human, as a distinct disease, independent of the active inflammation of ophthalmia; so it can hardly be said to merit a distinct place among the diseases of the horse. There is in the cataract of horses, independent of the opacity of the lens, generally much derangement of the other internal parts of the eye, particularly of the iris, which sometimes adheres to the lens, at others to the cornea, and in some cases it is so contracted as to render the cataract hardly perceptible. This internal derangement, therefore, prevents any benefit being derived from the operation of couching or extracting in him; add to which, a horse so operated on would be under the necessity, to render the operation useful, to wear glasses ever after. It has, however, been suggested that, even without glasses, so much benefit might be gained from it as to prevent accidents, as running against posts, falling into pits, &c. This, however, would be greatly overbalanced by the imperfect vision of other objects, and a horse, so operated on, would be sure to become very startlish. If, nevertheless, any person should be disposed to try the effects, the operation of couching is by no means so difficult as imagined, as the eye may be reached and steadied through the great orbitary *fossa*, which, being opened for that purpose, facilitates the operation. It has also been attempted without this*.

Accidental Ophthalmia.—The horse, it is evident, must be liable to receive injuries of the eyes, in common with other animals; the consequences of which are the ophthalmic inflammation, without its specific tendency to recurrence; at least when it occurs in a horse which had not before the constitutional predisposition. The symptoms are similar with those already detailed: but it may be right to remark of these cases, that although the symptoms are at first considerable, yet they more readily yield to a judicious treatment, and the amendment, once begun, is regular and progressive, and not subject to the varieties present in the specific affection. It may, therefore, not be improper here to introduce a caution to the veterinarian, that he should always first minutely inspect the insides of the eyelids on any occasion of ophthalmia. I have more than once found a hay-seed in the eye; once also a splinter proved the offending cause: and in such cases it would not be creditable to the medical attendant's abilities, to have this discovered by the groom. It should, likewise, be remembered by the veterinary practitioner, that it is always pru-

* A Monsieur Valet was mentioned to me, while in France, as having operated both in couching and extracting the lens, but I could not learn the result.

dent, and often indeed necessary, to ascertain, if possible, whether the disease be really of the true specific kind, or the simple effect of external injury. Various circumstances, besides those already pointed out, will *assist* him in this respect, though they may not *fully* ensure him; such as the age, the condition, and the other liabilities. For, unless he can ascertain this point, his treatment may be either too little or too much for the occasion; and, at all events, his prognosis of future return must be very open to error. The *Treatment* of accidental ophthalmia must correspond with that already laid down for the specific affection.

GUTTA SERENA.

FARRIERS call this complaint *glass eyes*, from the peculiar *glassy* appearance the eyes put on. It is supposed to consist of a paralysis of the optic nerve, and the remedies that have been made use of with success in the human subject seem to justify this idea. By others it is, however, thought to arise from the effects of inflammation, by which coagulable lymph is placed over the optic nerve, thus rendering the retina inaccessible to the stimulus of light. Any irritation on the tubercula quadragemini, as a spiculi of bony excrescence, or even pressure of any kind on them, which is liable to arise within the head from many causes, may occasion it. The veterinarian, and, indeed, every one concerned in horses, should make himself familiar with the appearance this complaint puts on, otherwise he may lie open to serious imposition. In amaurosis, a horse presents indications of blindness in his *manner*, though but little in his *eyes;* he seems cautious in stepping, and moves his ears quickly: but, above all, a hand moved close to the eye occasions no winking, unless held close enough for the motion to influence the air around, which an artful person might manage with ease. When this kind of eye is examined closely, the pupil will be found of one *invariable size*, and will not enlarge and diminish as in a healthy horse, when removed farther from, or nearer to, the light. The reason of which is, that the retina, ceasing to be open to the luminous ray, no longer influences the contractions of the iris. It is, therefore, from the peculiarities in the manner of the horse, from the want of motion in the iris, or rather from the invariable size of the pupil, and also from a *greenish glassy cast* in such eyes, that these cases may be distinguished. As it has hitherto proved incurable, we shall waste no time on its treatment.

CLASS XIX.

DISEASES OF THE SKIN.

GREASE.

[Eaux aux Jambes.

THIS disease appears to be an inflammation of the integuments and of the secreting capillaries of the lower part of the hind or of the fore legs, having something of a *specific* character attached to it. At least we are warranted in concluding it such, from what occurs in cow-pox, which is a specific affection which may be drawn from this source: but the human ulcerated sore leg would produce no effect on another person, or on any animal; because the inflammation is ordinary, and not specific. The disease appears to have its origin in debility, either general or local. It originates in general debility, when the system at large is debile from long-continued disease; or from want of proper nutriment; or from long-continued exertion: in which cases these parts being farther removed from the source of circulation, which itself labours under *additional* languor, they must suffer proportionally in a greater degree than those more within the sphere of the action of the heart; and hence accumulation takes place, which, if not removed, terminates in grease. This species of general debility appears a natural occurrence in spring and autumn, when horses are moulting or casting their hair, at which times swelled legs are very prevalent.

Grease may be said to have local debility for its cause, when the powers of the system are not properly balanced, as when there is great general vigour, with perhaps increased action from plethora, and likewise little waste to the system by exercise. Fluids press, not in proportion to their diameter, but to the height of their column; hence we can readily suppose that the venous blood must find a difficulty to its ascent. This resistance, at all times considerable, is much increased by circumstances, as size, in a tall long-legged horse; it is also increased in plethoric horses kept without exercise, because, not receiving additional aids from the pressure of the surrounding parts, accumulation takes place: and in a greater degree, when the whole vascular system is in a state of distention: weakness, therefore, is still more certain in those distended vessels remote from the influence of the heart, under all which circumstances the effects we treat of necessarily ensue. The capillaries of the pasterns likewise become unequal to the exertion of pressing forward the column of blood into the veins, when, to their natural remoteness from the source of circulation, any additional cause is superadded, either of weakness in themselves, or of resistance in the veins. For it must not be supposed that by this mode of reasoning we mean to infer any *original defect* in the parts. Nature formed the balance of power equal, as she made the functions equal; but this balance is kept up in some parts by their own force, and in others by the aid of other powers. Animals, being formed always for a life of nature, have no alteration in structure to accommodate them to a life of art, beyond their natural powers of bearing this change; hence, therefore, though the vessels, at this remove from the heart, must be supposed weaker in individual strength; yet, in a state of nature, they become equal from the support and assistance they derive from surrounding parts, more particularly from the pressure of the neighbouring muscles, tendons, ligaments, and integuments, during exercise; for by this means the capillaries of the skin are pressed upon to throw their blood into the veins, and are themselves likewise acted on and assisted in their functions by the same aids: a temporary respite is likewise given to them by the blood being forced into the superficial order. By this pressure, during exercise, the cellular membrane also is itself pressed upon to resist accumulation: and, lastly, the absorbents by this means become stimulated to greater action to remove any deposit that may have been formed. This is evident from the effect which takes place upon horses with swelled legs, which enlargements are removed by a few minutes exercise. In a state of nature, horses have these benefits arising from exercise *constantly*, and in due degree; for it is so necessary to their well being, that nature has given them an appetite almost equal in its stimulus to hunger, which is a love of *play*, to gratify which they are compelled to exertion and exercise. This is wisely given strongest in those in whom it is most necessary; in the young to enforce the circulation, that the vessels may be stimulated to their deposit for the growth of parts; and in the lusty and plethoric, that the absorbents may be kept in equal action with the secreting vessels: hence when, perchance, horses might find their food readily and without exertion, if they did not feel a stimulus to exercise by a love of play, they would become too fat, and fall into disease: we, therefore, see them at grass several times in the day race round a field with all the frolicksome sport of children. In the weakened and the old, in whom the absorption is equal, and often greater than the deposit, this would be unnecessary, and they are thus not stimulated by this passion. (See the subject, *Exercise.*) The horse is, therefore, an animal intended by nature for exertion; and, whenever we deprive him of exercise, we prevent the proper balance of power being kept up between different parts of the frame, and hence we must expect disease to take place; and thus it is that, whenever these animals are confined, and at the same time well fed, they almost invariably have swelled legs: and for the same reason it is that within twenty-four hours, horses taken up from grass or a straw yard begin to swell in their legs.

We deviate likewise from a state of nature, when we feed horses overmuch; for in these cases a larger quantity of blood is formed, which produces a distention in the vessels in general; and if to this plethoric state the want of exercise be added, these parts will be most likely to suffer from the reasons before given. They will first become distended, the consequence of which will be an inflammatory reaction of the vessels, by which the greasy secretion of the skin of the heels will become diseased; and the parts, that should have thrown out mucus in small quantities, will now pour forth a serous effusion in the form of *cracks*, or a general purulent one under the character of *grease*. A local stimulus is equally an after parent of debility, and therefore encourages grease. It is from this cause that it so frequently follows blistering; and if a horse be incautiously blistered in the hinder legs in the winter, grease is almost sure to follow. Cold and moisture are likewise circumstances favourable to the generating of this disease. Cold is unfavourable to absorption; it likewise weakens the general energy of the parts, and suspends the circulation; and, when this has happened, on the return of warmth the circulation becomes increased, and the vessels, being weakened, are rendered incapable of contracting on their contents. It is perhaps to the presence of cold, and its effects on the constitution, that swelled legs, cracks, and grease, are so much more common in winter. Grease has even been called a winter disease and the chilblain of horses. Moisture is likewise favourable to the complaint, for it first produces a determination to the parts, and then, as a parent of cold, it weakens the already-distended vessels. I was informed that, in a regiment of dragoons stationed in America, one officer was favourable to the custom of washing the heels of horses, and which custom he was permitted to exercise on his own troop; the result was, that this individual troop in three months furnished more than twenty greased horses, and the remainder of the regiment not more than two or three. It is, however, probable that there is nothing immediately detrimental in the simple washing; the evil arises from the legs being permitted to dry without friction, by which means evaporation generates cold.

It has been very ingeniously argued by Mr. Richard Lawrence, that the removing the hair of the heels is a very common cause of grease; but as, whenever accidental wet occurs, this hair must retain a large quantity of moisture, and hence be long in drying, occasioning a large evaporation, and thus generating much cold; so it may be doubted whether it is so detrimental. It is seldom, likewise, when there is much hair, that the dirt can be effectually removed from the legs; indeed it is too apt to be altogether neglected in such horses; though Mr. L. appears to think that the hair itself prevents the application of either dirt or moisture to the legs. That it may prevent the access of dirt in a degree, I believe; but I think it is evident that it does not prevent the access of moisture, by nature having supplied the surface itself with a defence of another kind from the secreted matter; on the contrary it retains it, as may be readily seen when they get once well soaked. Reasoning from analogy, from the resistance which feathers give to wet, is fanciful, but erroneous. The hair appears in a natural state to answer two wise purposes; it keeps the heels warm, which, from their distance from the heart, and from their exposure, require such a covering; it likewise prevents injury to the heels and fetlocks, from stumps and stones, with which, in a state of nature, most parts of the earth are covered: that this is true appears from what we observe in blood horses, who, as being natives of a sandy hot soil, require no defence either from cold or from stones, and hence have no long hair on their fetlocks. That it is even with us a defence from the cold cannot be denied; but, then, the benefit is counterbalanced by the evil of our permitting these parts to remain in our stables wet, thus generating cold, and applying it to the parts intended to be warmed. And as a defence, except to farmers' horses at plough, or to foresters' horses, it is unnecessary, for our fields are smooth, and our roads are levelled. The hair being suffered to remain, independent of its generating cold when wet, prevents the benefits of friction, by which warmth is produced and absorption promoted; nor are we liable, when the hair is long and thick, to detect the complaints of these parts in their early stages. The *acclivity* of the *stalls* in our stables has been considered as aiding the other causes of grease, and with some apparent propriety; for it tends to throw considerable weight on the hinder extremities, and, by the unnatural position of the heels, puts the parts on the stretch, and hence weakens them.

The *hinder legs* are much oftener affected with grease than the fore, which their situation sufficiently accounts for: they have less of the influence of the heart, and are forced to depend on their own energy more than the fore extremities, which are much nearer the source of circulation, and thus experience more of its power. To this it may be added, that the hinder legs miss some of the benefits that the fore experience from art; for in many instances, indeed in most, grooms, from a certain fear, rub the hinder legs less than those before: they seldom dare trust themselves on their knees, or seldom employ both hands at once to the hinder extremities; and not only do these parts feel the want of this, but they are also more exposed to cold in the stable, and more liable to the ill effects of moist dung or wet litter. Thick fleshy-legged horses are peculiarly liable to grease; therefore it is very prevalent among cart and coach horses, particularly of the low heavy breed: but among those which have a mixture of what is termed blood, in whom the cellular membrane is in small quantities, it is little known: hence, as this breed is now more in use than formerly, so grease is not so prevalent among coach horses. Colour, likewise, as it marks debility, so it influences grease; that is, it has been remarked that white-legged horses are more liable to cracks, to grease, and to diseases of the feet, than others, whose legs are dark.

The *Cure of Grease.*—Grease has several stages or states, each of which presents considerable varieties; and according to the existing state or stage, so will the proper treatment vary. It must likewise vary according to the cause from whence the disease arose. When this affection is accompanied with great general vigour, or originates from plethora, which is a parent of local debility, as we have explained; it often shews itself in the form of cracks, which come on without great previous swelling. But when grease originates in general debility, it frequently first assumes the form of swelled legs. However, these must not be considered as invariable facts, though sufficiently common. These several states or appearances which grease assumes have different terms, and are apt to be considered as distinct diseases: but the causes producing any one of them may produce the other, and the treatment of all must be grounded on the same principles: nevertheless, for simplicity of reference we shall consider these several states separately, still blending the character of the specific affection and the treatment. Swelled legs without discharge have been already fully considered, with dropsical swellings. See *Class* VIII. See also *Condition*.

Of *Cracks.*—As a consequence of general plethora, the capillaries of the heels are subject to have their secretion not only increased, but to have it altered also. This state is frequently the consequence of a sudden change in the habit of life, and therefore frequently shews itself in young horses at once removed without caution from grass or straw, to hot stables and corn. At first there will be simply heat and itching in the part; the horse will be observed to rub one leg against the other, and sometimes to stamp with his foot, the whole surface appearing more red than before, but perhaps without *enlargement*. If this state be not attended to, there succeeds an oozing out of a serous discharge from a kind of crack, of which there are sometimes several. Occasionally the suppurative state follows so closely on the adhesive inflammation, that pus or matter appears to flow from them from the first; but, if suffered to proceed, pus always comes from them first or last. In this early state, frequently little more is necessary than a saturnine wash, joined with attention to regular exercise; proportioning the food to the exertion; keeping the parts free from dirt, from moisture, and from permanent cold. But when they occur in a horse of a very full plethoric habit, and an ulcerative process is fully established, the cracks shewing much virulence and tenderness, then something more is necessary; as a moderate bleeding, with alteratives, and a nightly bran mash; or even one or two doses of physic may be prudent, if the horse should be of a very gross habit. The cracks themselves must be carefully washed with warm water, whenever the horse returns from exercise; after which, bathe with any mild astringent lotion, as the following:—

No. 1.—	Superacetate (*sugar of lead*)	two drams,
	Sulphate of zinc (*white vitriol*)	one dram,
	Infusion of oak bark	a pint.

Mix.

Sometimes the irritability of the parts requires the application of a cooling poultice, previous to the use of the astringent, which will now and then irritate, until the inflammation has been a little appeased by milder applications. In these cases a turnip or scraped carrot poultice will often prove very beneficial. These cases sometimes prove very obstinate, particularly when they occur in coarse horses, and have been brought on by sudden changes of stabling, feeding, &c. I have occasionally found nothing prevent fixed grease from supervening but turning to grass.

Swelled Legs, with Discharge.—When grease has its origin in general debility, there is usually accumulation, in the first instance, within the cellular membrane, as well as a serous discharge from one or more cracks over the general surface of the heels. The curative plan in this case differs from the former, and is more complicated. It should be commenced by lessening the watery deposit; to which end we must diminish the distending column of blood, but not by general bleeding, for that would weaken, and thus increase the disease; but by taking away that part of the blood that can best be spared, by which means we strengthen the distended vessels, without exhausting the system. This we do by very mild diuretics, by remedies determining the watery parts of the blood towards the skin in the form of perspiration, and sometimes also by mild purges; but the former are more immediately advisable in general debility; because in these cases, particularly by mild diuretics, the watery parts of the blood are, as it were, simply separated: whereas, purging appears to be more the increase of a secretion, that answers some necessary purpose in the system, and, as such, the operation calls more of the powers of the constitution forth, without any additional advantage. This appears the proper mode of considering this circumstance generally; but I must not forbear to mention, that I have now and then, even in cases of emaciation, witnessed the good effect of one or two mild doses of physic; the discharge has mended, the horse's carcase has become let down, and other signs of improved condition have appeared. It was before hinted that cases occur of discharge from the heels, where astringents, immediately applied, only irritate. Every practitioner must have met with such instances, as they are sufficiently common; the cause of which is attributed by farriers to *humour*. Without cavilling about this extensive term, we know that this form of the complaint originates in an irritable and inflammatory state of the vessels, which must be altered before they will suffer themselves to be even gently stimulated by the mildest astringent applications. This irritable state is easily detected by the red sore look of the heels, the ichorous discharge, the tenderness to the touch, and the stiffness on motion; and it is also frequently characterised by the inflammation going on, actually making the heels smoke. This highly irritable state of the vessels can only be reduced by poultices. Sometimes it most readily yields to those made with bran, and wetted with Goulard water: other cases are most benefitted by those made of scraped carrots; others by mashed turnips, previously boiled (see *Poultices, Mat. Med.*). By the use of this kind of softening application, the heat, the tenderness, and the redness, will abate: the discharge also from a thin ichorous one will become white, bland, and purulent. At the same time, likewise, that the poultices are producing this effect on the discharge, the general swelling should be counteracted by alteratives. The following unites the necessary properties:—

No. 2.—	Oxymuriate of quicksilver (*corrosive sublimate*)	ten grains,
	Supertartrate of potash (*cream of tartar*)	three drams,
	Nitrate of potash (*nitre*)	ditto,
	Prepared antimony	ditto.

Give this every night in a mash, except the complaint take place in a very emaciated horse; when, instead of the oxymuriate of quicksilver, substitute the same quantity of arsenic. On the contrary, if the patient be of a very full plethoric habit, add one or two drams of powdered aloes to the diuretic, making the whole into a ball instead of a powder; watching, however, the action of the aloes, that it does not proceed to active purging or griping. In some cases, when the expense has not been an object, I have found the following an excellent alterative in cases of grease:—

No. 3.—	Sulphuretted quicksilver (*Æthiops mineral*)	half an ounce,
	Supertartrate of potash	one ounce.

Give every night in a mash. In these cases, also, one or two doses of mild physic are often useful; and when the parts have been brought into a proper state for the action of astringent applications, wash with No. 1; or, instead, either of the following may be sprinkled over the sores:—

No. 4.—	Powdered oak bark	one ounce,
	Subacetate of copper (*powdered verdigris*)	two drams.

Or,

No. 5.—	Alum, finely powdered, ...	one dram,
	Charcoal, ditto	half an ounce,
	Chalk, ditto	two ounces.
No. 6.—	Subacetate of copper (*verdigris*)	half an ounce,
	Prepared calamine	an ounce,
	Tar	four ounces.

Mix, and smear the parts lightly night and morning, and after each exercising, having first washed them with warm water. When, also, much tumefaction takes place, united to the use of any of these, a linen bandage is often beneficial; beginning at the coronet, and rolling it more than half way up the leg, being careful that it is only done with a very moderate degree of tightness at first. As amendment proceeds, great care is requisite to prevent relapse, by avoiding the original exciting causes. This will be best effected, in full strong subjects, by long-continued walking exercise, with moderate feeding, particularly by the use of green meat in summer, and of carrots in winter, avoiding much corn, but, in lieu, allowing a sufficient quantity of less heating food, as those kinds already particularised. Bran mashes, as tending to open the body, should not be lost sight of; and when it can be conveniently managed, place the horse in a loose box. But when the complaint occurs in one already emaciated, or weakened from other causes, give only moderate exercise, but let this be compensated by a loose place to live in; feed liberally with green meat in summer, and an occasional malt mash; and, in winter, give carrots, beet, boiled potatoes, or other food of this kind. I have, in cases where these could not be got, experienced the greatest benefit from spearing the corn, for the use of such horses as were low in their flesh and condition. (See *Materia Medica.*) Any *change* of food, almost, is proper; at least, any not manifestly injudicious. I once observed the best effects follow the substituting of beans for oats, and this in a horse not particularly emaciated; but I had previously remarked, that oats passed away unchanged, which *ground* beans did not do.

Before we quit the subject it may not be improper to remark, that this species of grease is frequently the result of blisters injudiciously applied, when the legs are in a state of swelling and debility; and it may be offered, as a caution to the junior practitioner, that he never attempts a blister, particularly of the hind legs, under such circumstances. For, towards the close of the year, or during winter, or whenever there is a previous determination towards the heels, if blisters are applied without considerable precautions and subsequent care, it will be hardly possible to prevent the legs, particularly the hinder, from becoming greasy immediately afterwards.

Confirmed Grease.—This is to be considered only as a more aggravated stage or state of the former; in which case the matter that issues has a fœtid peculiar smell, which strongly characterises the disease; so much so, that a person used to it can at once tell whether a greasy horse be in a stable or not. The inflammation that was before principally confined to the secreting capillaries, now affects the integuments generally, producing extensive ulceration with intermediate dry horny scabs: the hair stands erect; the whole surface becomes exquisitely sensible and vascular, bleeding on the slightest touch; and the vessels of the heels not only secrete pus, but some of them take on a peculiar action, and form horn; so that, in the advanced stages and violent degrees of this complaint, hardened horny knobs form over the fetlock, some of them being vascular, while others are more hard and insensible; and which protuberant portions are called *grapes*, from their figure. The constitution sympathises much with this extreme state of grease, and the horse, unless very well fed, becomes weak, lean, and irritable: good pus or matter is seldom produced, but a peculiar fœtid discharge.

Treatment.—It becomes a question, whether, in a case of confirmed grease, even if it were in our power, it would be prudent to stop the discharge at once; for when secreting vessels have been long habituated to any action, they can seldom be suddenly checked with impunity; and in this case also, were the running stopped without previous preparation for the change, it is more than probable that some morbid effects would arise. To commence the *Cure*, therefore, of confirmed grease, we must prepare some other parts to take on this action of forming pus. But it is to be first remembered, that the discharge from grease is seldom a healthy one, and it is hence much more difficult to check than one that is simply purulent; therefore, while some other parts are preparing to receive this purulent action, the heels themselves should be subjected to a treatment that may produce a more healthy secretion in them. The best means I have ever witnessed for effecting this, has been a fermenting poultice, made with either barley meal, flour, oatmeal, linseed, or any other farinaceous matter capable of fermenting with yeast. This should be applied every day, as soon as mixed, and suffered to perform all its fermentative process on the leg; when, by the action of the carbonic acid gas, or fixed air let loose, it is remarkable what a change is performed on the part, bringing on, from the most ichorous discharge and irritable state, a mild bland pus-like fluid, with a decrease of irritability. (See the formulæ for these, under *Poultices*, *Mat. Med.*) Should either the trouble or expense of these be objected to, a carrot or turnip poultice may be tried instead, either of which may be applied till it produces a secretion of healthy matter; but it must be remembered, previous to the use of these means, that no ulcer shews a favourable disposition to heal so long as its surface remains above the level of the surrounding healthy parts; therefore it is essentially necessary to the cure, that these sprouting luxurious portions should be reduced even with the surrounding integuments. Caustics only render these *grapes*, as they are termed, more luxurious; but the mode best adapted to their removal is, to scrape off all the horny deposit, and thus level the surface with a very blunt knife; which, when effected, the poultice may be applied as directed. To prepare the other parts to take on the formation of matter; on the first day of applying the poultice, if the horse be large and tolerably strong, put a rowel in the belly, and introduce a seton on the inner side of each thigh; or place two rowels only, one in each thigh. If the horse be either small or weak, one rowel will be sufficient. In three days the maturating of the rowel and setons will be complete; and, in this time, by the above means, the heels will have taken on a more healthy action: it is now, therefore, that we are to attempt the stoppage of the discharge, which can only be done by the use of the most active of those applications, termed astringents, which will stimulate the parts to take on the adhesive inflammation. For this purpose either of the following may be tried as a wash, to be used daily, or every other, or every third day, or as often as the irritability of the parts will permit: some cases may require either of these applications strengthened, others weaker than here detailed: try, however, the weaker first:—

No. 7.—Nitric acid (*aquafortis*) .... one ounce,
Water .... eight ounces.

Mix.

No. 8.—Sulphuric acid (*oil of vitriol*) .... one ounce,
Water .... ten ounces.

Mix.

No. 9*.—Oxymuriate of quicksilver (*corrosive sublimate*) three drams,
Spirit of wine or brandy .... one ounce,
Soft water .... ten ounces.

Dissolve the mercury in the spirit by the help of a mortar, then add the water.

No. 10.—Subacetate of copper (*verdigris*) . . . half an ounce,
Sulphate of alum (*alum*) . . . . ditto,
Sulphate of zinc (*white vitriol*) . . . . ditto,
Superacetate of lead (*sugar of lead*) . . ditto,
Tar . . . . six ounces.

Mix.

This may be smeared over the parts daily, and will seldom occasion so much irritation as the former; but it is essential to the cure, that a considerable inflammation should be raised; the necessary degree of which must depend on the state of the case, and temperament of the patient. The *clivers*, or *goose grass*, has been likewise extolled as a remedy for bad grease cases: four ounces of the expressed juice are directed to be given daily, as a drink, and a poultice of the herb, mashed, is to be applied to the heels. When the discharge has ceased, it will sometimes be found that coagulable lymph has been thrown out, by which a hardened, thickened state of the limb remains; blisters may, in this case, be first tried, to promote the removal, assisted by a run at grass; but should these, as is sometimes the case, fail, the stimulus of firing should be tried. It must likewise be remembered, that this complaint is very liable to recur again; the parts have taken on a habit, which, though removed, they easily assume again, and the secreting surface is likewise increased. This recurrence is also best prevented by firing, for by this means there is a great lessening of secreting surface, by the making an extensive cicatrix or scar; and the limb gains additional strength by the artificial bandage which the firing occasions. A remedy, not, I believe, much known, and which I have had few opportunities of trying myself, is, however, well worthy the practitioner's attention, which is that of *active pressure:* where it can be borne, it has given considerable relief in the form of a uniform bandage of considerable tightness. Nothing has hitherto been said on internal medicines, nor on other parts of the treatment as regards food, or exercise; in fact, it will at once strike the judicious reader, that exactly the same rules, and the same cautions, will apply here, as have been detailed when treating on the other states and stages of this complaint. The constitutional tendency to disease must be equally amended by the internal remedies there laid down.

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MALLENDERS AND SALLENDERS.

[La Malandre et Solandre.

When a disease appears in the follicular openings on the integuments, exhibiting a scurfy or scabby eruption at the posterior part of the bending of the knee, it is termed *mallenders:* and when a similar one appears at the ply, or bending of the hock in front, it is called

* Mr. White relates two remarkable cases of confirmed and virulent grease, cured by the application of corrosive sublimate in the form of a wash, when other means had failed. I have also often seen it beneficial: the strength of the application should be increased to the full amount that the animal can bear.

sallenders. Neither of them lame or do much harm; but sometimes, when neglected, they degenerate into a more ichorous discharge, a little more troublesome, and always unsightly. Both of them are very easily removed by washing with soap and water, and by applying the following:—

Camphor	one dram,
Subacetate of lead (*sugar of lead*) . .	half a dram,
Mercurial ointment	one ounce.

Mix.

WARTS

[Des Porreaux.

Are best removed by the application of a thread tied round them; or they may be cut off with a knife or scissars, and the root touched with any caustic body. There is sometimes seen a sprouting luxurious species, whose roots are larger than their heads, so that a ligature is not easily passed around them; these are best removed by touching their surface daily with what is by farriers called butter of antimony. In the older books of farriery they are called *anbury*, or *ambury;* and many celebrated recipes for their removal are handed down from one sapient operator to another.

The following application will seldom fail to remove such as cannot be conveniently got at by the knife or ligature, dressing with it once a day:—

Muriate of ammonia (*sal ammoniac*) .	two drams,
Powdered savin	one ounce,
Lard	one ounce and a half.

MANGE.

This filthy complaint is too well known to need the detail of many characterising marks; however, it will not be amiss to warn the junior practitioner, that he may sometimes save himself much trouble, and warn his employers of its approach, by attending to circumstances that might otherwise escape his notice. When a horse has much scurf at the roots of the hairs of the mane and tail, and when he appears pleased to have these parts rubbed; upon looking into them very closely, perhaps some small bare places may be seen; in such case, mange is coming on. Sometimes one or two spots only appear at first, which grow every day larger; at others, a few regular blotches are seen over the fore parts, leaving the skin bare, but without excoriation. It sometimes presents itself under the appearance of what is termed, by farriers, *surfeit:* not but that there is an apparent affection of the skin, under the name of surfeit, that is purely symptomatic of some internal affection, brought on frequently by sudden cold, sometimes from drinking cold water when warm; but which readily gives way to internal remedies only (see *Condition*, page 62). But the surfeit accompanied with hide-binding and bare blotches, having, in the centre, little pustular risings, is always referrible to a psoric affection, and which is commonly generated, or taken from another. The *Mange* is highly *contagious;* but, in well fed and properly groomed horses, it makes its advances so slow as to exist a long time before it is noticed; so inimical is cleanliness to its formation. The part where the collar presses, the bows of the saddle and pads, the head-stall bearings, &c., will first shew some scurfy marks that would be hardly noticed but for the pleasure the horse expresses when the curry-comb or brush passes over them. In badly groomed horses, on the contrary, its progress is more rapid, and the poll, the neck, and roots of the mane and tail, soon become bare, and itch intolerably, so as to make the animal rub them raw for ease. Thus it may be considered as having three distinct origins; one from filth, another from debility, and a third from contagion.

Cure of Mange.—It has been supposed that psoric affections were occasioned by the existence of animalculæ within the skin, which there is no reason to disprove. Whatever is the immediate cause, however, the effects are so filthy and disgusting, as to require the utmost energy immediately to overcome them. In every case of mange not attended with emaciation, but more particularly in that species called blood surfeit, bleed; and if green meat can be got, feed wholly on it, except, as before noticed, great emaciation be present, in which case give also malt mashes. In winter, allow carrots, beet, or any food of this description; and if these are not to be had, *spear* the corn, and give with bran: for, although not generally taken into the account, a change of food materially assists and expedites the cure. Give also alteratives, as the following:—

No. 1.—	Oxymuriate of quicksilver (*corrosive sublimate*),	ten grains,
	Nitrate of potash (*nitre*)	four drams,
	Supertartrate of potash (*cream of tartar*) . .	four drams.

Or,

No. 2.—	Sulphurated mercury (*Æthiop's mineral*) . . .	half an ounce,
	Supertartrate of potash (*cream of tartar*) . .	one ounce.

Either of these may be given in a mash every night, observing, at the same time, in case mercurials are used outwardly also, to watch the mouth. The *external applications* resorted to for the cure are various. I have used all the following formulæ, and can recommend every one of them. The three first are *washes*, and may be applied with a sponge, carefully wetting every affected part. The two latter are *ointments*, sufficiently efficacious, but not so neat as the former: these are also to be applied every morning, accurately rubbing every affected place.

No. 1.—	White hellebore	two ounces,
	Tobacco	two ounces,
	Lime water, strong and fresh made	one pint,
	Water	three pints.

Boil the hellebore and tobacco in three pints of water to a quart; when cold, add the lime water. Put the whole into a bottle, and cork it well, pouring it out as wanted.

No. 2.—	Oxymuriate of quicksilver (*corrosive sublimate*)	one dram,
	Spirit of wine or brandy	one ounce,
	Decoction of tobacco	a pint and a half.

Dissolve the sublimated mercury in the spirit, by rubbing in a mortar, after which add the decoction.

No. 3.—	Liver of sulphur	two ounces,
	Decoction of white hellebore	one pint,
	Ditto of tobacco	ditto.
No. 4.—	Finely powdered arsenic	one dram,
	Flowers of sulphur	six ounces,
	Tar	half a pound,
	Train oil	six ounces.
No. 5.—	Sulphur vivum	eight ounces,
	Staves acre, in powder	one ounce,
	Ointment of quicksilver	two ounces,
	Turpentine	ditto,
	Lard, or train oil	eight ounces.

After the cure is effected, it will be of the utmost consequence that every thing worn by the horse should be carefully washed with soap and water; as, the cloathing, halter, and, in fact, every appointment used. The stable utensils, and the stable itself, should be purified also by lime whitening, or washing with pearlash; otherwise the disease may be again taken from these things. It is also necessary that the veterinarian should caution the attendants about mangy animals to be careful of themselves; I have seen the itch taken from a mangy horse more than once: but, as soon as any proper applications are used, little danger is then present; in fact, it ceases with the first dressing.

HIDEBOUND.

I HAVE had many occasions of noticing that this popular term is erroneously applied, and that the *effect* is frequently mistaken for the *cause*. It is very seldom that hidebound exists as a *primary* disease of the skin, but as a *symptomatic* affection it is sufficiently common. It is unnecessary to enlarge farther on it; the introduction of it here is merely intended to keep the systematic order of diseases complete. All that regards the practical consideration is detailed under the article *Condition*, page 62.

CLASS XX.

DISEASES OF THE FEET.

FOUNDER.

I BELIEVE that every veterinary practitioner at all attached to his profession, has some particular *hobby-horse* in it; that is, that some one particular branch, sometimes one particular disease even, engrosses all his leisure attention. Most unfortunately it often happens that the one chosen is nearly, or perhaps wholly, incurable: the selection of which I should suppose could only arise from the glory of conquering the hitherto unconquered. Mr. Coleman spent much time in combating the *ophthalmia;* Mr. Morecroft, in *forging* of shoes; Mr. White, in experimenting on the *glanders*. Others have devoted their attention to the *farcy*. Mr. Bracy Clark's extreme ingenuity has been wasted, I am afraid, in devising a method of *fastening* shoes without the assistance of *nails*. While a new method of *castration* occupies the mind of another, who lives in a neighbourhood where a stallion does not reside once a quarter. My *hobby*, from the beginning of my veterinary pursuits, was the *diseases of the feet* in general, but that of *founder* in particular; and though, like my cotemporaries, I may not have advanced as much as I could wish towards a *cure*, I feel confident that, if I could infuse my ideas into the minds of persons connected with the management of horses, the *prevention* of many diseases incident to the feet, but of founder in particular, would be the consequence, and this by no secret method, but by a simple attention to the subject, on the broad scale of the economy of the animal in general, and the functions of the parts concerned in particular. I am the more led to this conclusion from the circumstance of my never having had a horse who became diseased in the feet while in my possession; and, although I have purchased a great number who have been faulty in this respect when bought, I do not remember failing to *relieve* every one, so as to render him serviceable to me, and comfortable to himself: and I am much mistaken, if the following observations and directions were properly attended to, whether others would not experience the same benefit.

Founder, as a general subject, is very important; and when it is considered as probable, that if it does not *destroy*, it at least renders *useless* more horses than all other diseases put together, its importance can hardly be rated too high. To a proper consideration of it, however, it must be regarded as consisting of two kinds, and these essentially differing from each other. The one is an *acute* attack, dependent on diffused inflammation or fever, like the inflammations of any other important organs: the other, a *chronic*, occasioned by local inflammation, sometimes dependent on constitutional liability, but much more frequently on outward occasional causes.

ACUTE FOUNDER.

[Fourboure.

Of all the definite and well-marked diseases of the horse, this has been most mistaken among the older farriers, and the least noticed among the modern. In many works on farriery it is not even mentioned, and in most it is little more than hinted at. I am at a loss to account for this, seeing that, though not a frequent disease, it is yet sufficiently common to have been many times met with by every practitioner who has only a tolerable range of veterinary practice; and, when so met with, it is, both in appearances and effects, too characteristic to be easily passed over without impressing the mind forcibly. Among common farriers, when this disease occurs, it has been very generally mistaken for an affection of the loins or chest; and thus, their applications being made to these parts, it has usually terminated either in the death of the horse, or in incurable lameness.

Acute Founder appears to have two origins. In one instance it is dependent on a true metastasis of primary fever. Professor Huzard says, " Cette maladie (Fievre inflammatoire simple) d'abord générale à toute l'économie, se termine souvent par resolution mais dégénère aussi en affection locale, et se change en affection inflammatoire, soit des poumons, soit de quelques parties musculaires, soit enfin, et le plus souvent dans le cheval en inflammation du tissue reticulaire du sabot." In the other case, the attack appears made more directly on the feet themselves. I have seen it consequent on translation of fever in pneumonia, and it has occurred likewise from phrenitis and enteritis also. In some instances it can be directly traced to the effect of obstructed perspiration; or at least of the sudden alternations of temperature operating in the production of general febrile affection, whose translation to the feet is sometimes perhaps accidental, and at others may be produced by some cause which has already weakened them. In this latter way, it often occurs after very severe exertions, as very hard riding or driving, with previous, present, or subsequent exposure to wet or cold, particularly of the feet, as washing them immediately after the horse arrives. I once saw it produced by permitting a horse to stand in the snow, after being violently driven. Or the tendency may, perhaps, be sometimes occasioned by first exposing the feet to extreme cold, and then suddenly removing them into a warm stable; the vessels of the feet, not being able to bear this sudden alteration, distend, and fall into inflammation. It may, in any of these cases, occur prior to the fever, which will then be symptomatic; or it may be consequent to it, when the founder itself is the effect of metastasis; and both are frequently occasioned, as before stated, by violent and long-continued exertions, particularly on hard roads, with subsequent exposure to cold, especially to the custom of washing the feet and legs when hot. It is no argument against this, that it is done daily to coach and post horses; habit reconciles the most contradictory practices. A careless rider or driver travels his horse in a cold day, perhaps through the snow, twenty or twenty-five miles in two hours and a half: being thoughtful only of himself, at his baiting place, he delivers his horse to an unfeeling stableman, with—'Here, ostler, take care of my horse; I shall want him in two hours.' In a profuse sweat, the poor animal is taken into the stable to stale, and to have his harness or saddle and bridle taken off, and, within five minutes after, he is again brought out and hung at the door with the bleak air acting on his smoaking carcase; added to which, his feet and legs are deluged with water; and when, from the excess of cold, his perspiration is absorbed, and his skin dry, he is taken in to be fed. Such a horse almost necessarily takes cold. If he had been travelled only six or eight miles, still he would most likely have caught cold, because he had been injudiciously exposed; but then there would have been, perhaps, no preference of parts. That is, in the former case, the long journey, and the quickness of it on a hard road, having heated and tendered the feet, they were the parts most disposed to fail; and the old adage is here made good, that *the weakest must go to the wall.* And, likewise, had the horse travelled slowly, or a moderate distance only, but yet in the *face of the wind*, with after exposure, he would be equally subject to an inflammatory attack, but then it would have been catarrh, or pneumonia; because the head, neck, and chest had been most exposed. Had the wind blown keenly from behind, and the journey been pursued with but moderate speed, it might then have occasioned rheumatism in the loins, or inflammation of the bowels; or, in fact, whatever part had at that time been accidentally or constitutionally the weakest, would probably have been the object affected. I mean by this to prove, that acute founder comes on like any other topical inflammation, and only operates on the feet, because in an attack of *cold*, under such circumstances as those pointed out, they are the most weakened parts. Founder may be confined to one foot, to two, or it may attack the whole four; but it is more common to the fore feet. I have seen it attack all the feet, apparently occasioned by the weight of the body and congestion, from long confinement.

Symptoms of Acute Founder.—When a horse labours under this complaint, the attendants are usually unconscious of the real nature of the disease; and it is not unfrequent that even the medical practitioner, when called in, does not immediately detect it, unless much used to these cases: for he finds the horse heaving at his flanks, with a quick labouring pulse; and, on inquiry, he hears that the attack commenced with a rigor or shivering fit; that the suffering animal has been lying down and getting up frequently; groaning with excess of pain, and occasionally breaking out into cold and profuse sweats. In such case, unless he be informed that the horse has been ridden or driven with violence, and afterwards exposed to cold; or, unless his eye catches the particular disinclination to remain on his feet, with their extreme heat, he is at a loss, frequently, whether to consider it an attack on the bowels, kidnies, or bladder; or an inflammatory or rheumatic fever. An experienced practitioner will, however, even though called in at first, when the symptoms are not altogether perfectly well marked, still observe that though the horse appear to suffer much pain, and to lie down and rise frequently; yet, that he does not attempt to roll, he does not look at his flanks, or kick his belly; and that, although not yet arrived at the height of the complaint, he betrays a peculiar manner of shifting and lifting up his legs; standing likewise particularly, by either drawing his hinder ones much under him to relieve the *fore*, or placing the fore under the chest to relieve the *hinder*, according as one or the other are the principal seat of inflammation; or, by a marked disinclination to remain long up, when the *whole* of them are affected. The practitioner will, however, be commonly saved the trouble of much discrimination; for he will, in general cases, not be called in till the features of the complaint are sufficiently marked, by the utter impossibility to make the horse remain on his legs; on the contrary, when forced up, he lies down again almost immediately, exhibiting every symptom of distress and uneasiness. As soon, likewise, as the complaint has arisen to any height, the feet will be found intensely hot, and the pastern arteries pulsating very strongly; which alone would serve to mark the disease. There is sometimes some little tumefaction around the fetlocks, and when one foot is held up for examination, it gives so much pain to the other, that the horse is in danger of falling. The poor beast groans and breaks out into profuse sweats at one time, and, at others, is cold: his eyes are moist and red, and his whole appearance betokens that he is labouring under a most painful inflammatory affection.

In this state the complaint shews itself the first two, three, or four days; after which its effects are various. In the worst cases, when the symptoms we have stated have raged a few days; a slight separation of the hoof at the coronet may be observed, from which may be pressed a small quantity of reddish ichor or thin matter: the sensible laminæ now losing their connexion with the insensible, by the efforts of the inflammation, the hoofs gradually separate, and, at last, drop off: or, in some cases, mortification at once ensues. At other times, the effects are not quite so violent or rapid; still, however, the termination is sufficiently unfortunate; for, instead of the death of the parts, or their falling into the suppurative inflammation, coagulable lymph is thrown out, which equally forces off the hoofs; but not until some time after, and not until the parts underneath have acquired some solidity; nor, indeed, till the germ of a new hoof appears, but which, if suffered to grow, never proves perfect: on the contrary, the horse usually remains permanently lame. I have likewise seen instances where coagulable lymph has been thrown out between the laminæ and under the coffin bone. This inflammation, however, not being sufficiently active to force off the hoofs, they have remained; but still have gradually become imperfect and deformed. This imperfect resolution may be known, before its effects on the horn become apparent, by the very peculiar gait the horse exhibits when taken out, and which, once seen, can never be forgotten: for he throws his feet forward in a seemingly burlesque manner, and brings them down as oddly on the heel. In fact, he clearly shews that he has lost the proper sensibility of his feet. In other cases again of imperfect resolution, the laminæ losing their elasticity and power, yield to the weight and stress of the coffin bone, which becomes pushed backwards, and, in its passage, draws with it the anterior crust of the hoof, which thus falls in; the pressure also of the coffin bone destroys the concavity of the horny sole, which, instead, becomes convex or pumiced, leaving a large space towards the toe filled with a semi-cartilaginous mass, and which is not an unfrequent termination of founder. But when the attack is not commenced with the extreme violence we have detailed, or when an early and judicious treatment has been adopted, the resolution of the inflammation will often be perfect. The horse will first exhibit some relaxation from pain: some inclination to eat will be observed, the pulse will moderate, and he will stand up longer. These favourable appearances will increase daily, and, in the end, the animal will recover the perfect use of his feet.

Treatment.—As soon as the disease is discovered bleed largely, as four, five, or six quarts, according to size and condition; backrake, and throw up clysters: but, unless there be actual costiveness, do not give physic, as it would be inconvenient to the horse to rise to relieve himself; neither is it proper, on account of the extreme irritative fever present; but febrifuge medicines should be given, as the following, twice a-day in a pint of warm water:

Tartarised antimony *(emetic tartar)*	four drams
Nitrate of potash *(nitre)*	four drams
Supertartrate of potash (*cream of tartar*).	ditto.

The feet themselves should be next attended to after the general bleeding. In the first place remove the shoes, and rasp the hoofs round as thin as is prudent, which will greatly relieve the pressure of the horn on the internal swollen tender parts. As each foot is rasped, let it be also bled from the toe (see *Bleeding*); after which immerse each foot into a cold poultice of bran and Goulard, and occasionally moisten the poultice with the same; or, if preferred, wet cloths may be kept around them, or sponge boots may be used. The horse should be extremely well littered up, and permitted constantly to lie down, as this position will favour the return of the blood: further to encourage which, his food and water should be given on the ground. In case amendment does not follow this treatment, the next day repeat the bleeding at the toe; and, if the general febrile symptoms run very high, bleed also from the neck again. Continue the cold applications to the feet, and proceed to actively blister around the pasterns, but avoid blistering so low as the coronets: neither would I recommend blistering at all, unless a beneficial effect be not apparent from the other treatment towards the close of the second day; but at this period, if the affection continue violent, by all means proceed to blister, and bandage up, as otherwise the blistering matter will be smeared over other parts. Hang a cradle also around the neck. As soon as amendment becomes apparent, common care only is then necessary; feed mildly, give plenty of water, allow the horse to rest much; and do not proceed to exercise until the feet have gained some firmness. Nor must it be forgotten that feet, once foundered, require great future caution in their management, as they are very liable to become again affected on any considerable exertion. In cases of *imperfect* resolution, thin the feet; and, if contraction have commenced, score the hoofs, blister the coronets, and turn out, or treat as under

CHRONIC FOUNDER, OR CONTRACTED FEET.

Chronic Founder, or *contraction* of the horn of the hoofs, sometimes called *hoof-bound* by the farriers, is, perhaps, of all the evils this noble animal is heir to, the most common and the most destructive. In this country I am convinced that it shortens the life of more horses than all other diseases united; and although the ruinous properties of this malady are very notorious and universally allowed, still they are not, I believe, considered so in the degree they merit: but whoever will pay as close an attention to the subject as I have done for some years past, will, I am convinced, fully agree with me. Nature, ever bountiful in her gifts, bestows organs on her children fully requisite for their *natural* wants; but for *unnatural* habits she has not provided: on the contrary, she always punishes *artificial* deviations from her established laws, and has left it to the *ingenuity* of mankind to counteract the evils he has entailed, by subjecting the various domestic animals to a life of art. Among these evils the subject of our present inquiry stands foremost; but on the operation of what *particulars* of this artificial deviation the mischief arises, very different opinions have been formed: and as upon a due comprehension of this subject our principal means of *preventing* this very important evil must be grounded, so it is of consequence that we examine and compare them separately.

It was the opinion of the French veterinarians, and of M. St. Bel as their copyist, that the *extreme paring* of the crust, the sole, and the frog of the foot, was the leading cause of contraction; and, therefore, on the first establishment of the Veterinary College, parings of all kinds were absolutely condemned, and the grand agent in the business of this supposed error, the *butteris*, was sent at once to the d—l. The unnatural and erroneous practice of forcing horses to stand constantly on litter, by producing artificial heat, has been considered as the immediate agent in contracting the feet. Others have attributed it to the friction of hard roads principally; while a still greater number regard a wrong system of shoeing as the grand cause. Mr. Bracy Clark has even written a luminous treatise expressly to shew that *all* shoeing, good or bad, necessarily tends to produce contraction, by the confinement the foot experiences from the nails.

A very minute attention to the subject, and a diligent examination of innumerable horses every year, have led me to differ very widely from the general opinions entertained on this head: on the contrary, I consider the popular doctrine of the *evils arising from paring the feet generally*, as having been productive of infinite mischief; and that, for one horse injured by paring, at least one hundred are ruined by letting it alone. I have been a patient attendant in many forges for hours together, and particularly where the drawing knife only was used, and I have invariably observed that, to avoid labour, the workmen are too apt to neglect paring altogether, contenting themselves with rasping the horny crust to a level, opening the heels, and smoothing the frog. Nor is this to be wondered at; for if the gentlemen, who are taught to cry out against this operation, were only once doomed to go through the extreme labour of *properly paring out* a foot that is but moderately grown, they would agree with me, that there was much more danger of its being neglected than of its being over-done. Dependent on this reasoning it may be proved also, that the popular outcry against the *butteris* is carried too far. The drawing knife is a neater instrument, and, for particular parts of the operation of paring, is infinitely most handy and proper; and it is much to be regretted that its use is not more common among country smiths, many of whom never use it but in cases of surgical practice: some do not, or cannot, use it even then. Deprive these persons, therefore, of the butteris, and your horse must go unpared; nor would there be any difficulty in proving, that, instead of being so destructive as supposed, it is, when *judiciously* and *dexterously* applied, a very useful instrument, as it will do more work in a minute than the drawing knife can effect in five: and where there are a number of large coarse horses waiting to be shod, many of them with very high and large feet, this expedition must prove of very great consequence.

What I have advanced, however, though strictly consonant with reason and fact, is so directly in contradiction to the popular doctrines and opinions entertained, that I shall be taxed with an attempt at novelty, or rather with an affectation of peculiarity, by what I have stated: but in answer to this, and fully to disprove it, I only request a minute attention and extended inquiry towards this subject. Nor must it be supposed that I am an *advocate* for the old system of treating the feet; on the contrary, in most of its parts I *condemn* it: for it is true, that the frog has been too often injudiciously pared, the bars erroneously cut out, but, worse than all, a thick heeled shoe with unequal pressure has been invariably afterwards put on. The sole tendency of what I mean to impress is, that extreme *general* paring seldom occurs; and that the evils of erroneous *partial* cuttings, bear no possible comparison to the mischiefs that result from that neglect of *sufficient* paring; to which the outcry raised about five-and-twenty years ago, and since kept up, has so much contributed, and which has, by its effects, propagated and increased this disease instead of diminishing it. But it must not in justice be omitted to state, that it is not the smith only to whom blame is to be attached on these occasions; for when a foot wants *much* paring, it is evident that a neglect must have occurred before it could be brought into this state. This originates in a mistaken opinion, common among the owners of horses, that paring of the feet is never necessary but when a renewal of the shoes is required; consequently, if a horse wear his shoes lightly, or is little used, he may not want new ones oftener than once in two months: but the owner appears utterly unmindful that all this time the feet are becoming preternaturally increased in *length*, and *consequently* preternaturally decreased in *diameter;* and as the labour of reducing such a foot is considerable, not only from the increase but from the hardness of the substance, so the chance that a proper paring will be neglected is greatly enhanced.

It appears, therefore, that the destructive tendency to contraction in the feet of horses, so common, is not dependent on one, but on several causes, and this I believe is the opinion of all who examine the matter attentively; but the several degrees in which these operate, I am disposed to contend, are, in general, erroneously considered even by these persons. It has been the subject of much of my leisure to trace this correctly; and if I have not laboured in vain, these operating causes of *contraction* are in *degree* according to the scale in which I have placed them. In the first place, and infinitely of greatest import, stands,

1*st*, A neglect of paring away the unnecessary parts of the horn.
2*dly*, The application of artificial heat.
3*dly*, The deprivation of natural moisture.
4*thly*, Constitutional liability.
5*thly*, Bad shoeing.
6*thly*, The existence of thrushes.
7*thly*, The removal of the bars, and too great lessening of the frog.
Lastly, The effects of pressure occasioned by long confinement in a state of inactivity, principally in an erect position; as is the case in some illnesses, and some lamenesses.

That a *neglect of paring* is the principal agent in this case, appears evident on considering the operations of Nature in general, and the structure of horn in particular. This bountiful mother, who supplies her creatures according to their wants, yet is inimical to waste, and gives nothing unnecessarily. Under this principle it is that a certain portion of horn only (at least in general cases) is furnished to each animal, and consequently it cannot be possessed in height and breadth too. I will not say that a high foot may not in many cases have, if critically weighed, more horn than a lower one; but, *cæteris paribus*, as it increases in height, it decreases in diameter; and, as a principle, this cannot be too strongly impressed on the mind, nor can any rule be found with fewer exceptions. In coach-horse dealers' stables, where four year old horses frequently stand for two or three months, without perhaps having their shoes removed or changed, this complaint is not only common, but almost every horse so situated becomes contracted in the feet: however, as it is not to such a degree as to cause immediate lameness, so it passes unnoticed; but the disease has commenced, and, when such a horse is sold, often before the force of the warranty is expired he is returned as unsound: but such is the force of habit, and such is the obstinacy of these persons, that, to avoid the trifling expense of removing the shoes, they risk the loss of the horse. In many cavalry regiments a similar neglect occurs, and every third horse, or even a greater portion, may be observed with high feet, and, as a *certain consequence*, with a partial contraction. As the system of shoeing in these regiments is generally good, and as they never stand on litter, or are too hotly placed; so it can only arise from their being shod by *contract*, by which means the shoeing only is paid for, but not the removes and paring: and this cause alone would destroy as many horses as an active campaign. It is not sufficiently considered that the *wear* the hoof would experience in a state of nature is prevented by the application of shoes: but the *growth* is not *stopped;* on the contrary, by rest and confinement in hot stables it is even increased beyond its natural limits. Instead, therefore, of a slight rasping once in six weeks, and sometimes even less frequently; in horses who exercise little, and wear lightly; instead of this, the shoes should be removed, at least where the feet grow fast, every three weeks; when the hoof should have a level paring throughout, so as to bring it to exactly the *natural* height of horn. But, as before observed, so contrary to this is the usual custom, that after an interval, such as we have noticed, a horse goes to the smith's shop with an inordinate quantity of horn; the extreme ends of which being far removed from the surface that secreted it, become so dry and hard, that the smith, even were he so disposed, can hardly make any impression on it; he, therefore, only rasps or burns a smooth surface, and puts the new shoes on the old horn. Neither is it unlikely that his duty and inclination in this case go hand in hand; for the owner having adopted the prejudices that all smiths destroy the foot by excess of paring, has probably given peremptory orders that his horse's foot should never be *cut away*. It would, therefore, be difficult to conceive how such a foot should avoid contracting; seeing it is a general principle, and subject to few deviations, that the cylinder of the hoof will lessen nearly in the proportion that it lengthens. By pursuing this subject through the other causes, this matter will be still further elucidated.

The *application of artificial heat* stands next in order as a cause of contraction; and when we consider the common properties of hoof, nail, and horn, it will be found that this cause and the former are closely linked and operate together. It is the well-known nature of these substances to be much acted on by heat; they become softened by it, but only so long as the cause is applied, for, as they cool, they again become hard; and as the heat applied evaporates some of the contained moisture, so they always become harder and drier than before. But they have another peculiar property, and which is the actual operating cause in producing this complaint. This is the disposition to contract its fibres generally into a circular form, and which approximation of the extreme ends of the body is always inwards, with a reference to the centre of the circle; and this equally, whether the heat be applied externally or internally. This action may be easily exemplified by placing the segment of a truncated cylinder, or cone, as a piece of a cow's horn, before the fire; or the natural hoof may be placed in the same situation, when the contractile effects of the heat will *lessen* the partial circle on whichever side the heat operates; that is, when at all moderate: when an extreme heat is applied, the effects are not invariably the same; but this is dependent on another cause, and is besides inapplicable here. This invariable disposition to contract inwards on the application of heat operates here most importantly, and much the more so, as the effects are the same, whether the heat be inwardly or outwardly applied: and in the consideration of the subject of hoof contraction, these particular circumstances cannot be too strongly impressed on the recollection. Thus much being premised, it will not be difficult to recognise the application of artificial heat, in a degree much beyond a natural temperature, to the feet of horses in various ways. The standing for years bedded up in hot litter, heated still more by a stable without ventilation, must operate, on the above principles, towards the contraction of the horn of the hoof in an extraordinary manner; and the more also, as it has been shewn that the longer the trunk of the hoof, and the thicker its walls, the more will this heat operate: consequently both cause and effect combine to increase the evil. Not only is the *external* heat applied to the feet increased by this erroneous practice, but the artificial life of such horses proves at the same time a source of additional heat *within*, which becomes also applied to the feet. For their high living, their long standing in one situation, and the increased temperature to which they are exposed, must quicken the circulation, and more caloric must be evolved. Both these causes of heat operating on the horn, its contraction is a necessary consequence; and when this takes place, even in the slightest degree, it must occasion pressure on the internal parts of the feet, which are exactly adapted to the horny envelopement. These being highly vascular and tender, are by this stimulated into counteraction, and inflame; which produces an additional source of heat, and is increased in a twofold degree, as the cause continues to operate. Travelling on stony or hard roads must prove also another fruitful source of heat from the friction occasioned; and when such exercise is either violent or long-continued, the production of caloric must be immense. Heat also not only acts mechanically in contracting the horn, but it also operates additionally, inasmuch as it is one of its principal properties to promote an *unnatural* increase of the growth of horn both in length and thickness, by means of the stimulus it affords to an additional secretion. Thus, therefore, the evil is by this agent also greatly increased. Another source of artificial heat has been inveighed against in the bitterest terms, which is the application of a heated shoe to the sole of the foot, the evils resulting from which certainly reprehensible practice have been, however, greatly overrated; and the more so, I apprehend, as it is used in some measure as a substitute, though an improper one, for paring; and likewise as in the unequal shoes of country smiths it may be even necessary to demonstrate the bearing points that would otherwise escape notice: nor is the practice ever, I believe, carried to any very hurtful extent.

The *absence of natural moisture* must also tend in no small degree to produce contraction. Moisture has exactly the contrary effect on horn to what heat has; its application, therefore, greatly tends to counteract the contractile disposition. It also softens, and thus enables the pressure arising from the weight of the body to expand the relaxed hoof: but when, by the extreme length and thickness of the hoof, its resistance is increased beyond even the power of the moisture to penetrate, even this benefit, when occasionally applied, becomes lost. In a state of nature it is evident that the hoofs must meet with much moisture, of which a life of art wholly deprives them. A stabled horse frequently does not get his feet once moistened in twenty-four hours; even his only chance from the splashing of his urine is carefully prevented by the litter: but in a state of nature, at least during one-third of this time, these parts are exposed to the dew, and, during the remainder, are frequently immersed in rivers and ponds. Horses also less artificially treated than those of the gentry, as farmers' horses, and the generality of those kept in the country, experience the benefits of moisture to a certain degree; for they get turned out occasionally, and consequently we find they are proportionally less subject to this evil.

Constitutional liability is certainly likewise a source of contraction, and this to a considerable degree; but the remote cause of this tendency it is not easy to account for, any more than the constitutional liability to cataract. It is probable that both are connected with the life of art we have subjected the animal to; for it would be an attack on all-bountiful Nature which she does not deserve, to suppose she has *originally* given so destructive a disease as ophthalmia must prove to a wild horse; and founder would prove scarcely less so. Neither can the introduction of the eastern breed have wholly produced it, though it may certainly have increased the tendency; for we have numerous proofs that contraction of the feet was a subject treated of in the most antient writings on farriery. This liability must, therefore, be attributed to the general exciting causes of increased circulation occasioned by artificial habits, though the introduction of the eastern breed, as being of a more sanguineous temperament, may, as before hinted, have considerably increased this tendency. In the arid plains of the east a small foot was not only sufficient, but also most convenient; while the moist pastures of the north required a broad flat support. When, therefore, this breed was introduced to this kingdom, and became universally diffused among us, we cannot wonder that the small foot became propagated also, which, not being natural here as there, might easily prove a source of mischief. There are very few breeds which have not some small portion of what is called *blood* in them; but those that are original and purely northern, as the heavy cart horse, and some of the mountainous, it is remarkable are much less affected with it; and, on the contrary, blood horses of all others are peculiarly prone to it. Some colours also seem to have a greater disposition to contracted feet than others: in dark chesnut horses it is particularly common; and I think the better breed of blacks are rather more subject than some others: white feet also, as being weak, are very liable to it. It is possible that the circulation in the former may be in some measure quicker than in others; in confirmation of which, it may be observed, that they certainly possess a peculiarly ardent fiery disposition. It is probably from an increased circulation, as well as greater confinement, that stallions also are so prone to it. In fact, the more this subject is examined, the more proofs arise, and the more clearly these truths evince themselves.

Injudicious shoeing.—This certainly operates in producing contraction, and perhaps not in one point only, but in several. The custom of nailing the shoes on so extremely tight, particularly where the crust is not very strong, must affect the feet considerably, by irritating them, and by preventing their ordinary expansion. The bad form of the shoe must also be very hurtful; the unequal pressure tenders and inflames the foot; but of all the errors in the form, none is so hurtful as the thickness of the heels. This baneful method is still in full force, and, therefore, the evil it occasions is not at all abated. By this the horny heels are worn away, and corns are produced, the constant pain of which inflames, heats, and consequently contracts. Nor does the inward slanting direction of the *foot surface* of the heels of the shoe contribute much less, though it has been attempted to be proved that this does not operate unfavourably, which is certainly erroneous: but it does not follow from this that *all* shoeing must necessarily occasion contraction, at least not in the destructive degree maintained by Mr. B. Clark, as is proved by the very circumstances we are detailing: for, were this the case, farmers' horses, which are more early worked and some of them *often* shod, and almost all of them subjected to bad shoeing, must necessarily be affected most of all, instead of which it is exactly the reverse. We shall have occasion to enlarge on this in another place.

The *existence of thrushes* is too much passed over among horsemen. I am fully persuaded that they operate in the production of founder in a much greater degree than is usually imagined; and in many hundred instances I never met with a truly *harmless* thrush. This complaint may be a cause or a consequence of contraction. It is the latter state of it I here allude to; the other will be examined under the subject of thrushes. As it is well known that thrushes are an exuding of matter from the natural or artificial openings of the frog; and as no purulent matter can be formed without inflammation, nor can inflammation exist without an increase of heat; so, having already proved how heat acts, it will not be difficult to understand how every thrush must tend to contract the foot in which it exists.—See the subject of *Thrush.*

The *destruction of the bars, and too great lessening of the frog.*—That both these errors are productive of contraction there can be no doubt: but I cannot help thinking that the particular attention to these immediate causes, when veterinary medicine first became regularly studied among us, has been productive of considerable harm, not as being in itself erroneous, but because it diverted the mind from causes of the evil much more active and mischievous. In the generality of country-shod horses, the bars are always cut away, let ever so little other paring take place; yet these horses have less contraction than others: and though the frog also be described as a wedge-like cushion, purposely placed by nature to keep the walls asunder, a very little examination of the parts will shew that it is utterly unfit for this purpose, having but little solidity and force, and being divided in its centre, which weakens it to a great degree: whereas, were it intended for a wedge, it would certainly be solid throughout. The principal intention in the formation of the frog appears to be as a hanging point of support to the foot, to prevent it from sliding, which the crust and sole would be liable to do were it not for this admirable contrivance. This matter being already fully treated on, when describing the anatomical structure of the foot, we shall not pursue it further; but presuming the natural insufficiency of the frog to prevent contraction to be fully established, it is evident that the simple lessening of it cannot *materially* assist contraction: and we are further led to this supposition, from observing that many horses remain with open heels, who are deprived of the action of the frog, either by its being cut away, or by the operation of the calkins of the shoe, which effectually elevate it beyond the requisite pressure, to enable it to act as an expander.

Lastly, *The effects of pressure from long standing.*—This is by no means an uncommon cause of founder, both acute and chronic. In violent inflammations which prevent horses from lying down, it has been already pointed out how it produces the acute kind. It occasionally likewise, by the effects of congestion, produces the chronic also. Instances are not wanting where it has taken place in one foot from favouring the other which was lame. Weeks and months occur, in some cases, when horses cannot lie down; under which circumstance contraction is likely to take place, by an inflammatory action excited, heightened also by the application of external heat around; for this reason it comes in long voyages often. From what, therefore, has been advanced, it appears to me that some of the most popular causes assigned as principal agents in contracting the feet are more harmless than is generally supposed. Good shoeing tends, perhaps, but little to it. Bad made shoes must do it much more, but still not so much so as is usually imagined. Neither, as we have shewn, does the destruction of the bars and frog account for it; and still less will the extravagant paring, in general falsely attributed to the smiths. appear the cause. We must, therefore, look to the other sources we have pointed out, acting in conjunction, as the *principal* agents; but to the preternatural increase of horn, and the omission of paring it away, as most of all conducive. Having thus considered the *causes* of contraction, we will next proceed to the *appearances* it presents, and the *consequences* that follow.

Symptoms and Appearances of Chronic Founder.—The hoof, from an almost circular form (see *Description of Foot*), becomes, when foundered, much elongated; and, on taking up such a foot, the frog, instead of a full bold appearance, seems wedged and squeezed between the contracted bifurcations of the heels, which, in these cases, usually experience the greatest share of the contraction, and are then said by dealers and grooms to be *wired in*. Some contractions operate on the whole circumference of the horn; more frequently, however, the heels, as being the thinnest parts, suffer the most; and the inner one, as being the weakest of the two, is generally more drawn in than the outer: nor is it uncommon for it to be confined to the inner side only. Sometimes the contraction affects the whole of the cylinder of the hoof equally; sometimes it is greatest round the coronet, and at others it is most lessened towards the sole: but contracted heels more frequently present their narrowest surface below. From the different degrees of inflammation which have existed at different times, the hoof is often encircled with horny rings, and which are more common in the weak thin foot than in the strong. The hinder hoofs, though not wholly exempt, yet are infinitely less liable to contraction, from the absence of many of the exciting causes present in the fore. They are in the first place thinner at the toes, and thicker at the heel, which greatly destroys the contracting tendency. They are much less exposed to heat and to pressure, and meet with more occasional moisture. It may be also remarked, that, when they are contracted, it more usually affects them throughout the whole circumference; though I have seen them also "*wired in*" at the heels. Neither does the contraction of the hinder feet produce such serious consequences as that of the fore. Some horses bear long and considerable contraction before lameness ensues; and it may be regarded as an established fact, that a small contraction hastily applied, produces more immediate lameness than a much greater one more slowly brought on. Dealers' horses often fall very suddenly lame, without much apparent lessening of the foot; the reason is, that coming from farmers or other country persons, they are unused to the hot stables they are placed in, when they get into these hands, and the hoofs thus suddenly lessen. This effect is, in general, easily removed by standing in water a few days, which as suddenly expands them. From the causes before detailed, contracted hoofs are almost always higher than others, and the sole is likewise generally concave: it is in general much thicker in substance also, which greatly adds to the pain usually felt in progression. From the pressure that occurs on the parts within, there is much external heat, and pain is experienced even when at rest, which obliges the horse to relieve himself from the additional pressure arising from the weight of the body, by alternately placing one foot forward and then the other; which grooms call *fencing*, or *pointing*. Whenever, therefore, this is observed, however free from lameness the horse may appear, such feet are diseased: and more frequently on close inspection in these cases one may detect a shortened step and "feeling" mode of going, as though the horse walked on hot irons; and the proper sensibility seems to be lost, for such horses seldom step true, but trip and stumble. Nor can we wonder that lameness should be the consequence of contraction, when we consider how exquisitely sensible are the internal parts of the foot, and how completely they fill up the cavity, which being lessened, must subject the contained parts to pressure between the hard substances of the coffin bone, the walls, and sole. This pressure, so experienced, occasions reaction in the vessels, and inflammation ensues; by which these vascular parts are rendered even more turgid and full, and the poor animal most likely feels as much as we do after a long day's walk in tight shoes. When this pressure is not very considerable, the inflammation will be moderate, particularly if the cause be simply mechanical, and when the horse has no constitutional tendency to contraction. In such cases the tenderness will not absolutely lame him, but the horse continues his work, and gets but slowly worse, though, if attentively observed, he will be seen to step a little shorter, to trip oftener, and to be somewhat tender on rough ground; yet the alteration is so gradual, that the evil often remains undiscovered, till some accidental circumstance increases it, when he will become suddenly lame. If a farrier of the old school be called to such a case, the shoulders are searched, and are probably condemned to a painful treatment as the affected part. But when, in addition to a constitutional liability, a neglect of paring occurs, united also perhaps with some of the other assistant causes, the complaint proceeds more rapidly; the highly inflamed vessels deposit coagulable lymph between the laminæ, and over the sensible sole, which produces a morbid sensibility, but destroys the natural one, and occasions these cases to be expressively called, by the common farriers, a *numbness* in the feet; as making them move as though benumbed. The evil does not, however, usually rest here, but the inflammation extends to the bones and cartilages; and while the former throw out bony spiculi around, the latter become almost wholly absorbed, and their place supplied by bone; and consequently extreme lameness must then inevitably ensue.

Treatment.—From what has been premised it will appear that contraction may arise from an inward, or an outward cause; that is, that when a constitutional liability exists, the internal parts of the feet probably become first affected, and the heat and inflammation occasioned produce the contraction. In such case it is evident that enlarging the hoof will not prove a permanent cure. In other instances some outward cause, as heat, deprivation of moisture, or neglect in paring, may have first occasioned a lessening of the hoof, the pressure of which on the internal soft parts may have occasioned such reaction and inflammation as to have produced some of the evils detailed. Here likewise enlarging the hoof can only be palliative. But fortunately there are other cases wherein no internal derangement has taken place, although the outward pressure may be considerable, and have produced heat, tenderness, and lameness. In these instances the ill effects are not permanent, but, by enlarging the hoofs, the pressure will be taken off, and the evil removed. It will naturally follow from this view of the matter, that it is very important for the veterinary surgeon to endeavour to form a correct judgment of the state of the internal parts of the foot, before he gives an opinion, or proceeds to act. In the one case no means would be equal to a perfect cure; and consequently it would not be prudent to recommend a tedious and expensive process, when a palliative treatment only ought to be adopted: but in the latter case a perfect cure would follow a judicious mode of operation, and, therefore, these circumstances would not deter from it. This judgment can only be formed from a close attention to appearances and facts. If the contraction have not existed long, or even if it have, yet have proceeded very slowly; and particularly if it can be learned that the horse, from confinement, neglect of paring, and other artificial habits, has evidently been exposed to the *outward* causes producing contraction; then there is every reason to conclude that the internal parts are not materially affected. This will also be rendered still more likely if there exist no signs of predisposition to the disease, from colour, breed, &c. &c.

To *enlarge the contracted hoof*, many mechanical contrivances have been invented; some of them very ingenious, and most of them more or less productive of the desired end: but unfortunately for all such plans of cure, in most instances, as soon as the operating cause has been removed, contraction has again returned. This has happened so frequently, that it has made many persons inimical to the attempting any thing of the kind. The reasons of this failure are various. In the first place, the horse is, too often, again subjected to high feeding, heat of stable, neglect of paring, a want of moisture, undue confinement; and probably is again allowed to stand on litter. Any of these will operate in its reproduction, and no case can resist their combined influence. In other instances thrushes reappear, and; being neglected, prove a source of renewed contraction. Some also may reproduce it by a constitutional liability, not sufficiently counteracted by more natural habits, as turning out, &c. Although, therefore, candour obliges me to own, that a return of the affection is not uncommon; yet it is more than probable that many of such cases are attributable to the causes assigned.

The oldest remedy for contraction was *drawing the sole;* on which we will waste no more time than to observe, that if every wretch who drew a sole was to lose his scalp, it would be but a just retribution. The next remedy was the old screw shoe, which was little more than a common shoe jointed at the toe, and having a screw at the heel, by which it might be expanded at pleasure. This shoe has been in very common use, and has proved useful; but there are many objections to it. The first objection is common to this and to all expanding shoes, that in many cases it begins at the wrong end; for contraction is frequently greatest at the coronet, and likewise frequently commences there. The reasons for this are, that the horn is weakest at the coronet, and there the resistance is less also; for below, the intervening parts form considerable obstacles to the contraction. The next objection to this shoe is, that it acts on the whole circle of the hoof, whereas in the majority of instances the contraction exists principally in the heels, and in some in the inner heel only. To obviate these objections, some years ago I adopted shoes whose joints were variously placed according to the contraction; for a hoof contracted generally, I framed a joint at the toe in the old way. When the heels only were drawn in, a joint was made opposite each quarter; and when the inner heel only was affected, I used one with a joint on that side only. These joints were not operated on by the former clumsy method of either sliding bars or heel screws across the foot; but by small screws within the body of the shoe, that acted as levers, and forced one limb of the shoe from the other. Each heel had also a *clip* to embrace the bars. With these shoes I have frequently extended contracted feet, and in many cases, in conjunction with thinning and moisture, their use is marked and considerable: but they, in common with all other expanding shoes, are still liable to objection; for whenever either constitutional liability exists, or any of the external causes are allowed again to operate ever so slightly, I have observed the recurrence is more frequent after mechanical expansion by the means of shoes than after any other of the plans in use. The expanding process, by means of screw shoes, was a few years ago successfully (that is, to himself successfully) practised by an officer of the army: but the recurrence of the complaint, so common after these means, soon destroyed the undeserved reputation of the process, and it fell into disuse.

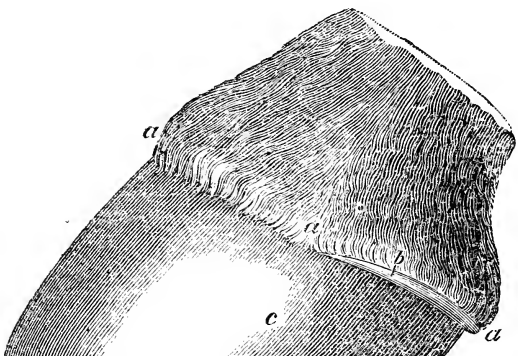
Other means have also been used for the cure of this complaint; such as dividing the heels their whole length; taking up the pastern arteries; and lately taking up the pastern nerves has become popular, and has been much practised. (See *Neurotomy.*) Firing the coronet has been tried; blistering also. Turning out has long been the common remedy; and immersing in moisture has been little less so. The inefficiency of most of these, and the liability of a recurrence of the complaint after their use, long ago induced some practitioners to endeavour to make the foot itself enlarge its horny covering. To this end they lessened the resistance of the envelopement by numerous deep scores around, operating as so many hinges, on which the hoof, yielding to the pressure of the internal parts, expanded. To this was sometimes added a thinning of the hoof generally: but very seldom were the heels lowered or the sole divested of its inordinate increase; so that only half the proper benefit was derived. When Mr. Coleman began his career, he adopted and amended this plan; and, by his recommendation, it became more known and practised than it had heretofore been. I also, previous to this, had made some trials of it; but at that time I preferred the quicker, though less permanent mode of the expanding shoe, assisted by moisture and other supposed auxiliaries. I had at one time eight horses, each under a separate process for reducing hoof contraction. An extensive subsequent experience has taught me to depend principally on what may be called a *natural* and *voluntary* expansion of the hoof, in contradiction to that produced by expanding shoes, which may be termed the *mechanical* and *forced* enlargement of it. By the former mode a more *radical cure* is effected; for the parts are themselves brought not so much to enlarge the materials of the old hoof, as to form altogether a new one; and which, if the former disposing causes of contraction be avoided, will not be subject to disease. The means I have long and successfully used, and which I shall proceed to detail, are of this kind; and though I lay no claim to the invention, yet I believe few have tried it so extensively, and few, if any, have so varied its modes, or watched its progress so attentively as myself: and, therefore, though the general practice of it be not new, the full detail of it, I am persuaded, is so; for hitherto this valuable means of removing contraction has been hardly more than hinted at.

When a hoof is contracted, on a removal of such portions of offending horn as can be spared, a considerable part of the pressure is at once removed, and the parts within begin immediately to reinstate themselves, and to enter on the process of forming an enlarged circle, which sufficiently shews the beneficial tendency of such a proceeding. And it is upon a removal of the horn in such a way as to lessen the contraction as much as possible, without weakening the support of the hoof, that the nicety of this operation depends. The mode of doing this will be to take away such portions as can be best spared, and yet such as are the principal agents in the injury. These prove to be, in most cases, the contracted horn of the heels, and likewise, in no less a degree, the inordinate increase of the sole; for, strange as it may appear, experience has fully proved, that a thickened state of the sole, instead of affording a support to a tender foot, is the most painful addition that can be made to it. To render the performance of *this useful operation* easy and intelligible, I have added a figure representing a hoof so operated on, and which, with the following directions, will enable any intelligent smith readily to perform it. It should, however, be premised, that when thrushes exist in a foot or feet to be operated on, it is highly necessary that they should be first removed, particularly if considerable; unless, indeed, it should be very clear that they are actually occasioned by the extreme pressure of the heels on the frogs; in which case proceed to thin the heels without too much lowering them, but sufficient to bring the lessened frog into the line of pressure as much as possible. Treat afterwards as directed under *Thrushes*, and, when an evident amendment appears, proceed to complete the whole of what is intended. A very small thrushy affection need not, however, impede the process, which, on the contrary, may be at once proceeded on as follows.

Expanding process.—First, let the *sole* be carefully pared. I have already stated that the increase of this, which is surprisingly great in usual cases of founder, greatly aggravates the painful affection; so much so, that I have frequently afforded instant relief to a hoofbound horse by merely thinning the sole. This fact seldom enters the head of a smith, nor is its operation sufficiently attended to even by the veterinarian: but at no time can a horse, at all affected in his feet by contraction, step with even tolerable ease without his soles are thin. Having, therefore, pared the sole all over equally, until the thumb, by a firm pressure, is able to make it yield, proceed to lower the crust generally, correspondent with a proper line of the sole; but lower the heels still more closely, in fact as much as they can safely bear, without depriving them of all their horny covering, or reducing them too much beyond the general level. In this paring, clear away the horn within the angle of the bars, and along the whole line; but leave the bars themselves sound and full. Do the same by the frog, leaving it as large as possible to relieve the weakened heels, clearing away only the ragged parts, unless it be thrushy, when all pressing and decayed portions, and all *under-runnings*, must be cut out clear.

Having finished the under surface, proceed to rasp the walls or sides of the hoof, beginning about the middle of the quarter, and rasping it to the heel. I find it however useful first to draw a line nearly or quite around the hoof, immediately under the coronary ring, which is that rising covered with the last hairs above the hoof, directly below the quick, marked *a a a* in the *fig.* This line should be made as near the quick or sensible part as possible, yet must by no means touch or wound it; and in doing this the horse's feelings will in general be a pretty sure guide, for, as the rasp approaches near the vascular portion, he will flinch considerably. This line proves a direction to the rasping, which should be carried close to it from the beginning of the quarters *about c* in the *fig.* to the heels, doing it lightly at first, as may be seen *by b* in the *fig.*, but deepening the rasping as it approaches the heels, so as to remove the substance of the horn in a progressive thickness from the quarters to the heels, rasping the whole surface uniformly from the coronet downwards, leaving towards the heels a covering of horn of only an eighth of an inch in thickness, or in fact so much only as the thumb nail can indent by a firm pressure, carefully however avoiding to go too deep, so as to wound the sensible parts underneath.

To avoid this danger, as well as to leave the coronary ring distinct, and free from the pressure of any more of the contracted horn than is necessary simply to cover it, the operation should be finished with a small drawing knife, by which means all the hard horn can be removed from parts where the rasp would be inconvenient, particularly towards the heels, where the thinning should be carried back quite to the inflections or binders (vide *posterior c* in the *fig.)*. The coronary ring should be left quite distinct by a clean angular removal of horn, as seen at *b* in the *fig.*; and upon a regular thinning from above downwards of the whole of the horny portion covering the lateral parts of the heels, except the thin lamella of covering we have direted, depends the perfection of the operation. I have endeavoured to make it understood that the rasping having commenced at the *black c* in the *fig.* is there to be lightly done, and a moderate portion of horn only removed, increasing the quantity as the rasping proceeds, till, having reached the centre of the quarters, it is then to be removed to the prescribed thinness. When finished, the hoof will present exactly the appearance depicted in the following figure.



When there is a very great thickness of horn, I usually also rasp the whole circumference of the hoof moderately, so as a little to lessen the general resistance without weakening the foot, which should be carefully avoided. To favour the further expansion, let the foot now be taken in front, and a line of rasping be carried from above downwards to a moderate thinness; not however so thin as at the heels, which would weaken the foot too much. This front rasping should not be more than half or three quarters of an inch over, and its intention will explain itself; for as the centre of *general* contraction must be here, and as even though the heels should be principally affected, yet there is usually also some lessening of the whole circumference, so the resistance to expanding is by this front hinge materially decreased; and of so much importance is this, that I have also practised it as a preventive at every shoeing with manifest advantage. When the inner quarter only is affected with contraction, as is now and then the case, then the rasping may be performed on that only; it will be very seldom, however, but some "*wiring in*" of the outer quarter also may be observed. It is evident that the above mode, performed exactly as here laid down, is principally calculated for the benefit of such feet as are contracted at the heels, with but a small lessening of the general circumference of the hoof. But there are cases in which the horny box is contracted *generally;* in such instances I have still rasped the heels, but not quite so deeply; nor have I carried the rasping so far forwards, but I have instead added three additional hinges to each side, by means of the old method of *scores* made in the hoof with a fine drawing knife. These scores should be narrow and of a moderate depth; the strongest hoofs will allow a quarter of an inch with perfect safety, and the weakest more than an eighth. One of these scores may be made a little within the heel side of the anterior letter *c;* the next a little beyond the toe side of the same letter; and the third between that and the front of the foot, where another ought to be placed. Having finished the operation thus far, put on a tip or tips with four or five nails only to each, and these towards the toe. To complete the process, if the heat and lameness were considerable before the operation, blister round the coronet, which greatly encourages the growth of new horn, and also tends to remove any mischief that the contraction may have occasioned.

The future management must depend on circumstances, and on the convenience of the owner. One thing, however, is indispensible, which is the application of moisture to lessen the remaining resistance, and thereby assist the expansion, as well as to promote the future growth of the horn. The best means of applying this moisture is to turn out to grass; but unless this be done where the situation is wet, less benefit will be derived. A dry pasture in a hot summer without rain would be injurious instead of beneficial; and a moist meadow, salt marsh, or one wherein is a pond to occasionally wet the feet, should be chosen. When thrushes exist, they need be no impediment to the turning out; but in such cases it is requisite that the horse be taken up every other day at farthest, and the thrushes dressed. When turning out is impracticable, it becomes a consideration as to the best mode of keeping the feet moist in the stable; and innumerable have been the contrivances for this purpose. Boots of all kinds, some containing sponge, some to be filled with poultice, &c. have been invented; but they prove so inconvenient, that they are seldom retained long in use. I have, however, seen some cased with small iron plates with hinges that answered the end tolerably. Standing in clay is a common plan, and, provided the horse stands level, it is not an inconvenient one; but often the paving of the stable is pulled up under the fore feet, and the poor animal is tortured by resting the lame limbs on a *descent.* On the other hand, I have seen him *mounted* up in a wooden trough, where much force was required to bring him into it. The best mode certainly is to cover the floor of a loose box with dung, mould, or clay, moistened so as to allow the wet mass to reach over the coronet. In this the horse can move about during the day, and may be removed at night to a stable, having the moisture still continued by means of wet cloths around the feet; and which cloths, when other means of moisture cannot be resorted to, may be wholly depended on. Two circles of thick woollen cloth, doubled over a tape within, will form a convenient apparatus, which tied (not tightly) around the pastern will adapt itself to the shape of the foot, and being dipped in water two or three times a day, will keep it wet. If moisture be duly supplied, the coronary ring will expand, and the new horn will proceed downwards in a large bulbous expansion: the heels also will widen, and this faster than the frog is able to keep pace with them, seeing its growth in these cases is generally slow. This will leave a hollowness and excavated appearance which it will take some time to fill up: and when this exists in a very considerable degree, I have considered it as a mark that the reproduction of horn is not entirely free from disease, and the benefits resulting from it will not be perfect or lasting. Care should be taken that the tips do not come off unperceived, and the horse remain without them. Every three weeks the sole should be carefully thinned, at which time the old horn may be slightly rasped again, and the line of separation between the old and new rendered distinct and angular as at first. If also the bulbous prominence of the new horn should be very high, thin it a very little by means of the rasp, to prevent internal pressure. In about three months the new horn will first reach the heels, and become opposed to the ground, at which time, if the horse be much wanted, he may be taken up, and may be *gently* worked in *bar shoes;* but if he can be suffered to remain longer without work, it will be advantageous. The whole of the appearances occasioned by the rasping will not be effaced in less than six months.

It remains to add, that a mode of relieving founder, as well as other painful affections of the feet, has of late become popular, and which is peculiarly applicable to such cases as have failed to become relieved by the process just described. This operation, first called the *Nerve Operation*, and more lately *Neurotomy*, is fully described in the SURGICAL OPERATIONS.

Groggy feet.—What is now understood by the term groggy, applies less to an inflammation of the laminæ than to a diseased alteration of the ligaments, bones, and articular cartilages, which are in those cases sometimes found eroded, and if not in an ulcerative state, at least in a very disorganized and irritable one. This affection occasionally attacks the articular cartilages and the capsular ligaments of the pasterns also, and in either case is the product of unnatural exertion, and equally tends to a bony deposit and eventual anchylosis. No treatment, unless very early in the affection, can offer much hope of amendment, when, if it assume any thing like an acute form, treat as in ligamentary extension, and finish the operation by blistering repeatedly.

THE PUMICED FOOT.

As this is a very common effect of both acute and chronic founder, an account of it very properly follows those affections. Mr. B. Clark has observed, that it ought to be called the *pomme* foot. Pumiced feet are in every instance the effect of inflammation; but the vascular increase may be an acute or a chronic one. When they are the effect of the former, the complaint immediately follows an attack of *acute founder,* and is brought about in the manner described when treating on that disease. But when it is produced by a slow chronic inflammation, its attack is much more insidious and slow, and its appearances gradual. The front of the hoof is first observed to fall in, and the sole to become nearly flat; at which time the horse begins to falter, and is sometimes very lame, at others he can move moderately well. The foot, when shod, generally presents no acquisition of horn; on the contrary, the sole becomes thinner and thinner, and at last bulges out into a surface more or less convex as the internal derangement is greater or less. The large wide feet of the native horses of moist counties are most prone to this evil, for their feet cannot resist the weakening and irritating effect of battering on stony roads; and least of all on the pavement of the streets of London and other cities. Any kind of feet, however, may take on the affection, after either hasty or slow founder, to which it is so frequently consequent. Thus, active founder is attended with a general increase of horn; but this consequence of founder decreases it, and both the walls and the sole usually become thinner: occasionally, however, the sole is increased by it. The laminæ seem first to become affected, and lose their elasticity; and their vascularity appears excited, not to secrete horn, but a considerable quantity of a diseased substance, which, with the weakened structure of these supports, displaces the coffin bone, drawing the crust with it, and greatly increasing the natural obliquity of the hoof. The pressure that the coffin bone thus displaced makes on the fleshy sole, occasions sometimes an absorption of its own edges, but always an interruption to the healthy secretion of horn, which accounts for the diminished thickness of the sole before noticed. The sole, therefore, being unable to resist the superincumbent weight, loses its concavity, and, yielding to the altered form of the parts above it, bulges into convexity. The whole of the parts within likewise become deranged in structure as well as situation. A large quantity of hardened matter, between the nature of horn and coagulable lymph, occupies the space in front, left by the recession of the coffin bone, which now approaches the heels, and rests there in an altered line of declivity.

The *Treatment* of these feet can be only *palliative*, as a removal of the deformity has never taken place. I have experienced much benefit from blistering the coronets in early cases, which has stimulated the foot to an increased secretion of horn. Every means must be taken to avoid outer pressure on the sole, which is not only painful, but actually aggravates the disease; and if sufficient rest were now and then allowed in these cases for the crust to grow level with the sole, such horses might be rendered useful; but instead of this it is permitted to wear away by repeated shoeings, until the sole is exposed, and becomes tender, and unable to bear the most ordinary pressure. Pumiced feet should not be kept too moist, nor can they ever be cured by turning out without shoes, though I once thought differently; but they may be very properly dressed every day, both sole and walls, with a mixture of tar and oil, which proves extremely beneficial to them. The *shoe* in use for these feet is sufficiently known, being framed with a very wide web, and either made so thick as to allow of being bevelled away on the inner surface, to receive the convexity of the sole without pressing on it, or otherwise cockelled generally to the shape. But lately a different mode has been practised by some persons, and strongly recommended, which is to apply a shoe so narrow in the web as to cover the crust only, but of sufficient thickness to elevate the sole above the chance of pressure from the ground. This shoe is said to obviate the ill effects of stones, gravel, &c., getting under the wide webbed shoe, which sometimes lamed the horse; and it is said that pumiced horses go best in these kind of shoes.—Facts are stubborn things: there can be therefore no objection to their trial, though, reasoning from analogy, I should be disposed to depend principally on the older method, which, if judiciously managed, will render such feet very useful. In some cases no shoe answers so well as a strong bar shoe.

CORNS.

[Bleime.

This unmeaning term is now so fixed, that no efforts of mine, did I aim at the *dictatorship*, could disturb it: but that it is a most erroneous one is evident, supposing that it drew its designation from being situated in the feet, where human corns unhappily dwell. In the human subject a corn is a mere morbid increase of the cuticle, and is itself never vascular: it is, in fact, no further a disease than by the consequences of its mechanical pressure. A corn in the horse, on the contrary, originates in an injury done to one of the most vascular parts; is itself equally vascular, and instead of tending to increase the cuticle (i. e. the horn) over it, it derives its principal character from being inimical to every future growth of it. These very troublesome affections arise from injury done to the vessels of the sensible sole, exactly at the surfaces of union between it and the horny sole, whereby blood becomes extravasated within the angle of the inflexions of the heels, that is, between the outer crust and bars. Corns appear in every instance the effect of undue pressure, by which the sensible vascular sole becomes acted on between the horny sole and the heels of the coffin bone. This disease is equally produced whether the pressure arises from the horn of the sole or the horn of the walls; and it is from the pressure of the walls of the heels bruising the sensible sole that corns are so common to contracted feet, and also to weak hoofs. It is also to the increased weakness of the inner wall and heel of the hoof that corns are so much more frequent in the inner than the outer heel; and from the superior strength of the hinder heels arises their little liability to them. But though the contraction of the walls of the heels does often occasion the complaint, yet it is much more frequently the consequence of pressure of the sole, the very form of which shews that it never was intended to be thus acted on; for the crust meets the ground, and the sole recedes from it in every part; consequently, whenever pressure does take place on the sole, it is unnatural, and produces injury. The general mode in which injurious pressure is applied to the sole is either by an improper form of shoe applied, or by not removing the horn opposed to the seat of corns, or by neglecting to renew the shoes themselves at proper intervals: and to one or other of these errors most corns may be attributed.

Bad shoeing operates in various ways, but in none more commonly than by the thickened unequal heel of the shoe, which is in general formed into a sort of clubbed end, that prevents its presenting a level surface towards the foot; on the contrary, a bulbous projection *indents* itself into the very part, as though purposely placed there to produce this injury. The custom also of making the seat of the shoe slant or bevel inwards, is, I believe, sometimes productive of corns, by forcing the crust to press on the sensible sole laterally. Neglecting to prepare the foot for the shoe is also a fruitful source of corns; for that part of the horny sole which fills up the acute angle between the crust and bars, the pressure on which is so injurious, is, in a state of nature, protected by the prominences of the frog and bars, as well as by the inclined direction of the latter; but as artificial habits alter the shape of the foot, this part becomes exposed; and, therefore, in preparing a foot for the shoe, this angular portion should be so pared as to remove it from contact with the iron, without weakening the horny covering of the sensible sole. For so surely as this part becomes subjected to pressure for any considerable length of time, so surely extravasation takes place, and a corn is formed, and this more quickly when the heels are weak. The third common cause is the neglect of removing or renewing the shoes at proper intervals. When a shoe has been long worn, the growth of the hoof carries it forwards, by which the parts originally opposed to the heels are carried beyond them, and now press on the sole, often becoming indented within the line of the crust, and producing a most injurious pressure. Sometimes, also, either from the original form of the shoes, or by long wear, they become loose and "*springy*" at the heels, as smiths call it; in which cases gravel is apt to make its way between the shoe and foot, and by the pressure of the heels during action, is indented into the substance of the horn; other gravel becomes received in the same manner, which presses the first still onward, till at last it meets the sensible part. As soon as it reaches here, inflammation ensues, and a very different complaint is formed to that of common corn; for in every instance of this kind suppuration proceeds, and the matter, unable to make its exit below or sideways, forces its way upwards, and a small tumour appears at the coronet, which breaks, and discharges a purulent matter. The treatment of these cases is referrible to the rules laid down for pricks, and in nowise differs from what is there described.

But the common effects of pressure from long-worn shoes, are the extravasation of a little blood, which, on paring away the horn at the angular point of the heel or heels, appears as a black or red speck, as the blood has been longer or more newly thrown out from its vessels; and it may be followed with the paring knife to its source in the sensible part. If the injury have been considerable, this blood itself may irritate and produce suppuration in a similar manner with gravel. But in general cases this extravasation remains unchanged, and, unless attended to, a weakened action of this part of the sole becomes permanent, and blood continues to be thrown out ever after upon any occasional renewal of the pressure. In such cases the horn itself over the part proves a source of future irritation, and therefore horses with old corns only go well when fresh shod and newly pared; for as soon as the portion of sole between the bars grows to a level with the surrounding horn, the sensible sole receives a fresh bruise, and lameness again appears. It is by contemplating this possible termination of corn, that the law has wisely considered every horse with this complaint as unsound.

Treatment of Corns.—When a corn first appears, it is not difficult by proper means to remove it completely; but when it has existed some time, the injured parts become weakened, and the diseased action of throwing out blood, instead of secreting horn, becomes familiar to them. As soon, therefore, as it is discovered, the cure should be immediately attempted; first, by removing with a fine drawing knife every portion of diseased horn around, and the whole of the extravasation likewise, avoiding, however, the wounding of the sensible sole underneath. Having done this, introduce any caustic liquid, as muriate of antimony, into the opening, which will act on the sensible sole by destroying the unsound parts, and by stimulating the remainder to a healthy secretion of horn. If any contraction of the heels be present, they should be slightly thinned to relieve the pressure; and, without this, it is probable a cure will be in vain hoped for. A shoe should be then applied, properly chambered opposite the weak part; or a bar shoe may be used, laid *off* the heel or heels, and taking its bearing on the frog. In a week's time, or less, the part will have gained sufficient strength, when the horse may be turned out; but, during this interval, introduce every other day a small pledget dipped in the escharotic liquid used, as muriate of antimony, a solution of lunar caustic, potash, &c. &c. (see *Caustics, Mat. Med.*) After the horse has been to grass a month or six weeks, if the meadow be tolerably moist, and the feet be naturally strong, remove the shoes, pare the horn lightly away from the seat of corn, not however sufficient to weaken the support, and then put on tips; but if it have taken place in heels naturally weak and low, continue the bar or chambered shoe. In this way corns may be permanently cured, when not of too long standing.

But when the derangement of this part of the sole is become habitual and permanent, a *palliative* treatment only can be pursued. In the first place, the pressure of the horn must be guarded against by a regular and frequent paring out of that portion between the inflexion of the heel; and if the hoof be very strong, and at all disposed to contract, the quarters also should be attended to, and not allowed to become too high or too thick. I have also in very strong feet found the use of a short shoe sometimes of the greatest service; but to a weak foot, either a chambered or a bar shoe is preferable. When the weakness is very considerable, or the corn a very bad one, a bar shoe is the most proper support, and should be constantly used; remembering in these aggravated cases to remove occasionally all the surrounding horn likely to press on the injured part, at the same time taking care to let the frog rest on the bar of the shoe. And whenever such a horse is shod, it is proper for the corn to be dressed with some active stimulant, as the butter of antimony; by doing which regularly when shod, and about once a week also in the intermediate times, I have rendered horses, before useless, able afterwards to work with comfort to themselves and satisfaction to their owner. In slight cases of corn, the shoe proper to be used is one of rather more substance than common, with the web a little wider than usual, and its width equal throughout, that is, as wide at the heels as at the toe; it should also extend rather farther back than it generally does, and present a perfectly level surface. This shoe will afford ease and protection: future pressure must be avoided by keeping the seat of corns clear from offending horn.

THRUSH.

Some pains have been taken to trace the source from whence this unmeaning term arose. Two centuries ago it was called *running Frush;* and as, before that time, in some of the very old treatises on farriery, which borrowed much from the French, we find it named *running Fourche,* it seems to be probable that it really did take its name from fourche, the French term for the frog, gradually corrupted into its present appellation of *running thrush.* This complaint consists in a diseased action of the sensible frog, whereby, instead of secreting horn, it produces pus, which escapes out between the cleft of the horny frog. It is very improperly considered by many as a matter of trifling import; but a little experience only in the diseases of the feet will shew that it is one of the most destructive tendency. Still more erroneous is it to suppose that thrushes can possibly do good by drawing off humours, or that there can ever be any danger in stopping them. On the contrary, there never was a *harmless* thrush, or one that could exist long without doing great injury, by laying the foundation for contraction of the foot in which it existed, by the inflammation and heat excited in the parts around. Various proximate causes produce thrush; the remote one is always inflammation of the sensible sole. Contraction, though a very common origin, is by no means the only one, for we observe them frequently in the wide open feet of very young horses, in which cases they appear to originate much in the same way as swelled legs, &c. by accumulation, or a determination of blood to the feet, from general plethora, which, occasioning inflammation, thrushes form. In many other instances their origin is to be traced to the application of moisture, particularly of *acrid* moisture, as that of dung, urine, &c., which, soaking the horny frog, at last penetrates it, and then becomes a source of irritation to the sensitive frog underneath. This effect of moisture accounts for the increased tendency of thrushes to affect the hinder feet in some instances, while the fore feet remain perfectly free from them. Contraction is notoriously a common cause of thrushes; but they are by no means necessary consequences of it, seeing many contracted feet are without them, though many more are with them; which is not difficult to account for, when we consider how likely it is that the inflammation accompanying painful contraction should extend itself to the vascular frog. The different actions of secreting organs are here strikingly exemplified. The inflammation attendant on contraction stimulates the laminæ and the vascular sole to an extra secretion of horn; but the same inflammation applied to the vascular frog diminishes the secretion of horny frog; and it is farther remarkable, that although the contraction may be removed, it is not often that a *full* secretion of horny frog readily again takes place. As contraction is a very common cause of thrush, so it is equally certain that a long continued thrush always ends in contracting the foot; and which is one of the few instances in which a complaint may be both a cause and a consequence. Neither can any horse be considered *safe* that has a thrush, for there is always some degree of tenderness felt; and, in these cases, if the point of a sharp stone at any time should penetrate the cleft, or any of the sinuses occasioned by the complaint when considerable, the horse will sometimes come to the ground at once from excess of pain. The appearances of thrush are sufficiently known: when mild, the matter escapes only through the natural cleft of the frog; but when it has existed some time, and affected the sensitive sole throughout its whole surface, all the fissures of the horny frog produce a purulent discharge of a peculiar fœtid smell; and such cases, if unattended to, particularly in the hinder feet, may degenerate into canker.

Treatment.—Thrushes may be always considered as local complaints; and it is not only impossible to do any harm by stopping them, but it is absolutely necessary in every instance to do so. In that kind we first noticed as sometimes taking place in the open feet of young horses, which, fresh from grass, become suddenly subjected to confinement, it will perhaps assist the cure if the plethora of the constitution be attended to; but in all other instances the treatment should be at once wholly applied to the affection. When thrushes are connected with a contracted state of the feet, it is evident that a removal of the irritating pressure of the walls of the hoof is necessary to a radical cure (see *Contraction*). When moisture has been the exciting cause, it should of course be carefully removed, and its occurrence again prevented. But this caution must not operate as a means of denying the application of moisture to the feet in ordinary cases, either as a prevention, or as a cure of contraction; for it is sufficiently easy, when necessary, to guard the frog against the effects of wet, and yet to apply it to all other parts of the foot; for when all the fissures of the frog are dexterously stopped with tow, charged with some oily astringent mixture, no moisture will penetrate to the sensible sole.

The present stoppage of thrush is seldom difficult, but to prevent its recurrence is not so easy always; for the parts having once taken on this action, easily fall into it again. Almost any astringent substance will check the suppurative action of the vascular sole, as *compound tincture of Benjamin (Friars balsam), tincture of myrrh, solutions of vitriol, alum, lead, &c.*, which may be either of them usefully applied for this purpose. Tar and salt mixed is also a good application, or tar and bole armenic; but perhaps the following combines the good properties of all in a very considerable degree:—

Ore of zinc (*prepared calamine*)	half an ounce
Subacetate of copper (*verdigris*)	ditto
Sulphate of zinc (*white vitriol*)	one dram
Tar	three ounces.

Mix.

Before the introduction of this, the frog should be inspected, and all the decayed hardened parts, concealing underrunnings and sinuses, removed; so that the introduction of the mixture may be facilitated, and the disposition to harbour filth and moisture prevented. The whole frog may then be very properly smeared over with the mixture; but more particularly, a small piece of tow should be charged with it, and by means of a skewer, or other similar instrument, pressed to the bottom of the cleft of the frog, and also into every other fissure that may exist, as at the lateral parts where the frog joins the heels, where sinuses very commonly form in cases of bad thrush. Care should be taken, when introducing the tow, to do it neatly, so that no parts hang out, by which means the dressing will remain secure two or three days;

but no application simply poured in, without the aid of some other substance, as tow, soft sponge, wool, or rag, which retains the application and guards against moisture, will answer so well. In bad cases the dressing should be repeated every day, in others every other day, or twice a week; but in all it is of import, as a guard, that the cleft should never be without the intermediate substance employed.

When it becomes necessary to turn a horse out to grass with thrushes, and which is often the best means of cure, it is of consequence to remember that this treatment should be equally actively pursued during the time the horse remains out, otherwise the moisture applied will aggravate the evil; but if once a day, or at least every other day, a pledget of soft sponge or tow, charged with the mixture, be introduced, so as to leave no hanging parts without, it will remain free from danger of escape, unless the frog should be in a very diseased state, in which case the tow should be fastened in with cross bars, as in canker; or a bar shoe may be put on, and the dressing applied under it. These precautions also are necessary when thrushes exist in feet operated on for contraction, and where the treatment requires continual moisture to the general horn, but the absence of it for the frog in particular.

SANDCRACK.

[Seime.

This is a solution of continuity between some of the horny fibres of the hoof, generally in a direction parallel to their growth; that is, from above downwards. Now and then, though but very seldom, these cracks exist in an horizontal position. The term *sandcrack* has been said to arise from the dirt or sand usually observed within the fissure, which is supposed to be its cause: but this is erroneous; for absurd as are many of the names of diseases in the old nomenclature of farriery, this has a more significant origin; and is called *sandcrack*, because it was formerly supposed peculiar to hot *sandy* districts, the heat of which, applied to the feet, gave them a disposition to *crack* thus. These fissures are more common to the fore than to the hind feet, not but that the latter are sometimes affected with them, particularly of cart and other heavy draught horses; in which cases they are most generally observed in the front of the hoof; whereas in the fore feet they are more usually situated towards the inner and less frequently on the outer quarters. I have, however, seen sandcracks in the front of the fore feet. In every instance, where it is not occasioned by some outward injury to the hoof, it is, I believe, brought on by a brittle state of the horny fibres; the effect of some of the same causes that operate in producing contraction, with which it is very nearly allied in origin; for it is very seldom observed but in such hoofs as have undergone some unfavourable alteration in form, in which the horn, having taken on a diseased brittleness, does not readily yield to the daily contraction of the walls, but some momentary application of force suddenly disunites a portion of its fibres.

The fissure is not always of a determined depth, being sometimes so superficial as not to penetrate the whole thickness of the horn, and occasioning no inconvenience at first. At others it exactly extends through the horn, but does not divide any of the sensible parts underneath: while sometimes again a lesion of some of these takes place. Neglect, and a continuance of work, will, however, commonly bring any case from the slightest into the most aggravated state. When the hoof is completely penetrated, it becomes a most painful affection, and productive of extreme lameness; for the divided edges of the horn are apt, during exercise, to admit the protrusion of the soft parts underneath; which becoming suddenly pressed on by the approximation of the horny edges, exquisite momentary pain is produced. From the injury done to the sensible laminated expansion, there is often a sprouting of fungus between the divided edges, which greatly aggravates the complaint. Accidents of all kinds, injuring the vascular origin of the hoof around the coronet, may occasion sandcrack also, as treads, stubs, &c.

Treatment.—A very different curative plan is proper to be pursued, according to the state in which the complaint may be found. The grand object must be to interrupt the communication between the crack and the sound horn, which will otherwise take on the fissure likewise: and when it occurs in a hoof evidently contracted and brittle, a radical removal of the evil will be best attempted by reducing the resistance of the horn, and by correcting its contractile tendency by the means recommended against contraction, such as a moderate thinning of the quarters, and the application of *future* moisture, after the edges of the fissure have been brought completely together.

Much difference of opinion has arisen as to the best mode of destroying the connexion between the divided and the sound horn. Some prefer the firing iron, others the rasp. Mr. White's method is that of *firing* the fissure, by which "*a glue-like matter*" becomes an artificial and *temporary* bond of union till new horn be formed, and the opening closed by ultimate connexion. This plan of Mr. White's is not, I confess, the one I prefer, but I have seen it very successfully practised. When a sandcrack is the effect of injury done to the coronet, the rising edges of the horn must be reduced almost to the quick, and the whole of the surrounding portion must also be thinned. Having done this, draw a line of sufficient depth, not to penetrate the quick, across the inferior limit of the crack, either with a drawing knife, rasp, or firing iron; which will prevent the further extension of the fissure. After this, bandage up; but should any inflammation remain in the original wound of the coronet, do not bandage tightly over that.

In the usual cases of sandcrack from a disjunction of horny fibres, the state of the opening mnst be first carefully attended to. When, either from pressure, the original depth of the injury, or when dirt has got into the wound, and suppuration has taken place, were an attempt made at once to close and bind up the opening, very extensive mischief would be the consequence. Instead of this, the hard edges of the horn should be first removed, and the surrounding portions thinned considerably; after which the opening should be dressed with a pledget of tincture of myrrh with aloes, friars balsam, &c. &c.; and over this another thick pledget spread with defensive ointment may be placed. If the irritation and inflammation are considerable, apply a poultice over all. In case of underrunnings and detachments of horn, the separated portions must be removed. But as this will seldom happen, consequently the removal of more than the horny edges is not often necessary. In a few days, by repeating a similar mode of dressing, the dirt will be evacuated, and the parts will heal, harden, and become dry; when the process about to be recommended for common cases, without suppuration, may be proceeded on.

When a sandcrack has occurred, and which shews no signs of suppuration, although it have completely penetrated the horn, and a little blood or moisture shews itself at the edges, from the effects of motion merely, proceed to thin the hoof around it, and next, by means of a camel's hair pencil, introduce within the edges a small quantity of solution of lunar caustic, as ten grains to a dram of water; or butter of antimony may be used, though I prefer the former. Bandage the hoof up moderately tight for two days, then again examine the fissure; when, if the oozing be altogether stopped, and no inflammation appear, proceed to draw a line of a moderate depth with a sharp firing iron, a very little above the upper limit of the crack, and another just beyond the lower limit also, and afterwards bandage as directed below. If preferred, these lines of separation may be made with a rasp, or fine drawing knife; but I have commonly chosen the iron, as I think the seared line of distinction stronger and more perfect than the rasped or cut one. But in case no moisture at all has appeared at the crack, and on examination with a probe it is clear that the fissure has not reached the vascular parts underneath, then the insertion of any caustic matter is unnecessary; the wasting two days for probable consequences is likewise equally so; and the *completion* of the treatment for the above state, and the *commencement* of the treatment for this, will be as follows.

The horse being shod with a bar shoe, and the hoof either pared away in a line with the crack; or otherwise the shoe chambered, so that the hoof immediately under the fissure may not press at all on the shoe (in a strong hoof the former perhaps is proper, in a weak one the latter may be preferable); proceed to bandage up the foot, so as to fulfil the following intentions. Completely bring the divided edges of the fissure together, perfectly retaining them there, and totally excluding moisture from entering the opening. Whatever mode will answer these purposes may be very properly adopted: perhaps the following, though a common one, is among the best. Melt some shoemakers wax, and smear all over the hoof; and, before it is quite cold, bind upon the wax neatly, evenly, and firmly, about three yards of tape, so as to include as much of the hoof as may be within the turns: fasten off with a hard knot, and again over the whole smear more wax, and lastly smooth it into an even surface. After all, rub over a little lard or other greasy substance to prevent the pitchy matter from sticking. The horse may now be turned out, which will be particularly desirable; or, if to be kept in the stable, he may be exercised every day by walking in hand. It remains only to remark, that as most of these cases take their origin from an altered condition of the hoof; so all the preventive means detailed under *Contraction* apply here after the recovery is completed.

PUNCTURED FOOT, OR PRICK.

THE under surface of the horny covering of the foot is unavoidably exposed to numberless injuries from sharp bodies penetrating its substance, which may happen in various ways, from nails, pointed flints, glass, &c. The shoe being partly torn off, and then stepped upon, may produce it; but the accidental puncture by a nail during shoeing is one of the most frequent causes of these accidents. Injuries of this kind are proportioned in their effects according to the parts punctured, and not entirely to the depth of the wound: a knowledge, therefore, of the anatomical structure of the foot is necessary to enable us to form a prognosis, as well as to establish a proper method of cure. A puncture through the fleshy frog, even to the vascular portion, is not productive usually of such serious consequences, as an apparently more superficial opening made through the centre of the sole, which may penetrate the capsular ligament, and either produce anchylosis or destroy the animal.

Whenever a puncture takes place, of sufficient depth to penetrate to the bony connexions (which may be ascertained by examination with a probe), and synovia escapes, the *external* opening should be enlarged; but it should be attempted to close the *internal* opening at once, by the application of the actual cautery, not to the immediate surface of the capsular ligament, but to the skin directly over it. If, however, this treatment has been neglected, and suppuration has actually taken place, the cautery should be omitted: but the action of the part may yet be attempted to be altered by the application of milder stimulants introduced by means of a brush: as diluted muriate of antimony with oil may be lightly pencilled over the outer edges of the capsular orifice; on which may be placed a pledget moistened with tincture of myrrh, or tincture of benjamin, &c.; and any mild digestive may be laid over all as a defence. If the inflammation be considerable, bleed at the toe, and imbed the whole foot in a poultice. A very deep posterior puncture may extend itself into the flexor tendon or its sheath, and is always productive of very great irritation and inflammation. In such case enlarge the opening, and if the wound be seen immediately after the accident, introduce any very mild stimulant, as the warm tinctures: but if the accident have occurred a day or two, and the inflammation be considerable, bleed at the toe, and place the foot in a saturnine poultice. When suppuration comes on, watch its progress, moderate the inflammation, give a free exit to the matter, and remove any horn that becomes detached. And as the life of these tendinous parts is inconsiderable, at each dressing a little of any of the above warm spirituous applications may be introduced, which will assist the healing, or, if a sloughing of any portion be unavoidable, will tend to assist its separation. A puncture of the sensible sole must be treated in a similar manner, remembering in every instance that *caustic* or *highly* stimulating liquids should never be introduced, as is often done, except under particular circumstances, which will be noticed. The introduction of tincture of myrrh, tincture of benjamin, or a mild solution of vitriol, &c., at the moment of the accident, is admissible; because it may gently stimulate the part to the adhesive inflammation; and if even suppuration be inevitable, the mildness of such applications cannot aggravate the process.

But the most usual cases of punctures are those which arise from a wrong direction of a nail in shoeing, in which it either presses on or actually wounds the sensible laminæ. This is commonly known to the workman at the time, by a peculiar sensation arising from the different resistance occasioned; or otherwise is detected by the flinching of the horse; when, if the nail be immediately removed, no ill consequences follow, unless the injury be considerable; and even in this case, were but a little common honesty practised, the serious evils that frequently follow these punctures might be commonly prevented. Were the nail immediately redrawn, the opening enlarged, and a little spirituous balsam of any kind introduced, it would very frequently heal immediately after; and even should it proceed to suppuration, still a depending orifice is made for the evacuation of the matter, and extensive detachment of horn prevented. But when a smith, in shoeing, considers the horse not actually *pricked*, though he may be conscious that the nail has taken a wrong direction, or is driven too high, he is apt, from laziness, to let it remain; and sometimes, even when he is aware that the nail has penetrated the inner surface of the horn, and wounded the vascular parts, he is often then not sufficiently candid to acknowledge it. The offending nail, therefore, even in such case, is allowed to remain, and, according to the extent of the injury, the inflammation becomes considerable the same night, or perhaps not till two or three days after. In such cases, as suppuration proceeds, the confined matter spreads around, detaching a portion of the fleshy from the horny sole, more or less considerable, and, at last extending upwards, it finds itself an exit by an opening at the coronet. In proceeding this course, the inflammation does not always confine itself to the parts nearest the exterior surface, as the sole and sensible laminæ; but sometimes, when not assisted by an artificial opening, it extends to parts less vascular, and whose action not being of that nature to make them immediately throw off the injury by forcing the matter outwards (as is done by parts more vascular), sinuses form inwards, and the disease then becomes *quittor*. Fortunately, however, the vascular action of the sensitive sole and laminæ being extreme, the matter usually proceeds outwards, and finds an exit at the coronet.

It may therefore, in pursuing this subject, be stated, that at any time when a horse becomes lame within a week after he has been shod, if the origin of it be hid in any obscurity, the shoe should be always first removed, and the foot gently struck all over with taps of the hammer. If the lameness springs from this source, and any part be injured by one nail in particular, at that part the stroke will occasion the horse to flinch. If this fail to detect the evil, pinch the toe and quarter round with the pincers, which, if the mischief arise from a prick, will readily point out the affected part by the pain felt there; and under this spot matter will have surely formed. Proceed in such case immediately to pare away the horny sole till it be very thin, when, on close inspection, if the paring be done within two or three days from the prick, a dark coloured fluid will ooze from one of the nail holes, but, if a longer period has elapsed, a purulent matter will appear. By a proper opening evacuate this, and then carefully examine the extent of the injury by the probe, as how far the fleshy and horny soles have become separated from each other, for to the same extent must the horn be removed; not, however, taking the whole away the first day, but completing the removal the second. No greasy matter should be applied over the denuded sole, but a pledget of lint, slightly moistened with compound tincture of benjamin *(friars balsam)*, or tincture of myrrh, may be laid on; and any mild defensive dressing may be applied over this.

When matter has proceeded to evacuate itself by the coronet, exactly a similar plan must be pursued; the original wound below should be traced and opened, so as to give a free exit to the pus. And in all these cases, when the symptomatic fever rages high, bleed, give physic, and treat in every respect as under inflammation. Perfect quiet is absolutely necessary in every instance of puncture; the slightest exercise irritates, and should be avoided. A shoe should be made so as to "*lie off*" the injured parts, and should only be very lightly tacked on with four nails unclenched.

TREAD, OR OVERREACH.

A wound about the coronet is a very common accident to horses, from one foot being set on the other, when the outer margin, or heel of the shoe, will wound the integuments, together with the vascular coronary rim. Or it may occur from a blow inflicted on the heel of the fore foot by the hinder one overreaching it. In the first instance, all these cases are to be considered as simple wounds, or rather as lacerated bruises, which, if extensive, have produced death in the surface and adjacent parts of the tread; in which some inflammation must occur to remove the edges thus injured. In no instance, therefore, should the irritating caustic applications of the farriers be applied, by which more extensive inflammation and an increase of sloughing are produced. On the contrary, wash with water to remove dirt, &c., apply a pledget of tincture of myrrh, or tincture of aloes, or compound tincture of benjamin *(friars balsam)*, &c.; and, if the wound be considerable, wrap up the whole in a poultice; if not, apply over it a simply defensive dressing, and bandage lightly up. Should the injury be slight, it may be healed at once by the adhesive inflammation; but if not, a moderate suppuration only will occur. Under some circumstances, however, more extensive mischief will follow, when the case comes to be considered under the subject of *quittor*.

QUITTOR.

[Javart.

It is not every wound of the cavity of the foot which can strictly be called a *quittor;* but to deserve this appellation, the wound must have existed some time, and have taken on a peculiar unhealthy state, by which the ulcerated surface produces a diseased secretion, which spreads the same action around; and instead of proceeding outwards, communicates itself inwards in various directions. In surgical terms, these tracts of ulceration are called sinuses; but by farriers are very generally termed *pipes*. It is not difficult to understand why any wounded internal portion of the foot should so readily take on this state, as it is found to do, when we consider that the internal parts of the foot have very different living powers, and hence are very differently affected under disease. When an injury happens to the integuments only, to the sensible laminæ, or to the other *highly vascular* parts, our only care is to lessen the irritation, when their vascularity quickly works their own reproduction. But when the injury extends to the ligamentous and cartilaginous parts, their living powers being small from their diminished vascularity, a very different complaint is formed, and a very tedious process is that of forming granulations in parts thus constituted. Quittor may have several origins—pricks from shoeing, or other punctures, as we have pointed out, oftentimes occasion it; an overreach also: but with draught horses the most common cause is a bruise or wound inflicted by a tread on the coronet; the high calkins of their shoes proving particularly mischievous on such occasions. Any part of the upper margin of the foot is open to this accident, but one of the quarters is most usually affected.

Treatment of Quittor.—The older farriers of almost every country adopted very violent means for the cure of this complaint, impelled to it by the obstinacy of its character and their erroneous views of its nature. The celebrated La Fosse, who was rather fond of novelty, in some measure overturned this practice in France, and introduced a new method, founded on an idea that the obstinacy and derangement that accompanied the complaint originated in the lateral *cartilages* becoming diseased, which he affirmed were capable of being thus affected, but incapable either of exfoliating like bone, or sloughing like ligament; and therefore, that, to promote a cure, the whole of that cartilage on the affected side must be removed. But his first premises were erroneous, for cartilages are vascular, and as such they must be capable of living action, though it is slow; and hence where disease exists, they will exfoliate and granulate like other parts. This practice of La Fosse was received in England with some avidity, and was still further propagated by the late Professor of our Veterinary College, M. St. Bel. But the awakened attention to this interesting art at that time, and the assimilation of its principles with those of human surgery, soon exposed the impropriety of this treatment. The removal of so large a portion of hoof as was necessary to get at the cartilage for its extirpation, and the certain destruction of the coronary secreting surface, from whence alone a full secretion of new horn could spring, were most fatal objections to this method of treatment. It is now the practice to consider that these parts, possessing little vascularity when diseased, require stimulating, and sometimes very actively; for it is necessary first to destroy the diseased surfaces, and then to excite the healthy ones, to enable them to throw off the destroyed portions. Formerly, as we have noticed, either the actual cautery or caustic were the means employed for this purpose, though the practitioners were unaware of the rationale of their operations. Of later date the knife has been used by some to dissect away the diseased surfaces, under an intention of bringing the parts into the state of a simple wound, and thus to promote a natural cure. Such is the present French practice: they first stop the circulation with a tourniquet, then dissect out the parts, bandaging tightly, and suffering all to remain untouched four or five days. But very weighty objections lie against this method also. Its very premises are wrong; the simple excising of organs, so little vascular as those affected in confirmed quittor, will not bring the part into the state of a simple wound, that is, of such a simple wound of soft parts as may usually be expected to heal at once: to which healing process there is often another objection, from the difficulty of exactly removing the whole of the sinuses with a knife; and it is well known, that if any of these be left unexcised, the disease is not subdued. It is further ineligible, from the great danger of wounding the capsular ligament in making the necessary sections, particularly where the sinuses run inwards. Were these not sufficient, the destruction of horn, and the separation of so large a portion of coronary ligament, would be most serious objections to the cure by the knife on ordinary occasions. Against the fire also much may be urged, but which is unnecessary, as it is seldom now employed; consequently nothing is left for us but the stimulating plan.

Previous, however, to entering further on the *treatment* of this disease when fully formed, it is necessary again to remark, that a wound into the cavity of the foot only becomes a quittor when it has taken on a peculiarly diseased ulcerative process; and even an accident may happen, and the cartilages and ligaments may be injured on the spot, and the integuments may be even lacerated and killed. All this may take place, and the consequent reaction may throw off the dead portions by suppuration, when the farriers would say a *core* has come out. At this period of the complaint it is, however, evident that the disease can neither be called or should be treated as a confirmed quittor, but simply as a wound or abscess; and it is to a different consideration of the subject that many of the future evils result; for farriers are too apt on these occasions, under an idea of assisting the *coring out*, to introduce strong stimulants, the inflammation excited by which actually occasions the evil they intended to prevent; for the less vascular parts then take on the disease, and sinuses immediately proceed to form. Until therefore the full operation of the immediate injury shews itself, and until there be evident appearances of unhealthy action, with an actual formation of spreading sinuses, apply no simulating applications internally; on the contrary, use every means to reduce inflammation. Thin the surrounding horn, and if the matter appear to penetrate in a direct line downwards, make an opening in the hoof below; but in other cases merely dress in the mildest way, and place the whole foot in a cooling poultice. Avoid motion, even of the slightest kind, and use other means of combating inflammation, as bleeding, low diet, and internal remedies.

Treatment of confirmed Quittor.—But when the complaint has fully established its character, then it can no longer be considered as either a simple bruise, wound, or abscess, but must be regarded as an ulcer composed of diseased branches, called sinuses or pipes, more or less numerous; and which ulcer has been attempted to be cured by means more *apparently* consistent with the modern forms of surgery; but, after all, no method has been found so *generally* successful as the long established practice of "*coring it out,*" which is nothing more than, by an escharotic process, to destroy the ulcerated edges and surfaces, and by raising a strong inflammation to produce a new and healthy action. Farriers have, however, fell into another error, from observing that, under some circumstances of bad quittor, a portion of ossified lateral cartilage has come away; and as this is by no means an uncommon occurrence, it leads numbers of them to consider the existence of a portion of offending bone in every instance as a part of the disease; and until they can produce a separation of a part of the lateral cartilage, which they consider when it appears as the very "*quittor bone*" they sought for (and which exfoliated portion being often ossified strengthens the opinion), and until this appears, they are not contented, but prolong the treatment to produce the desired end. But nothing can be more erroneous than such a consideration of the matter: the promoting a healthy action is all that is necessary for the removal of the diseased portions, and the re-establishment of the healthy.

The first necessary step to the cure is a careful examination, with a blunt leaden probe, of the extent of the ulcer, with the number and direction of the sinuses or pipes. Should any one of these proceed directly inward, and the instrument meets a firm hard body, it is more than probable that the bone is bare, when the prognosis must be extremely unfavourable; not but that portions of the coffin bone have exfoliated, and the case turned out favourably; but more frequently the reverse is experienced. When the capsular ligaments become ulcerated, and the joints exposed, the case is always hopeless; the excess of irritation usually soon anchyloses the joint or destroys the animal. The cartilages of the foot are commonly exposed, and sinuses run beyond them; but when these take an *inward* direction *behind* the cartilages, the case may be considered as an aggravated one also. When, on the contrary, the direction of the principal sinuses is outward, and downward, or backward, towards the heels, the cure will not probably prove difficult. It should be remembered that we must not be misled by the smallness of the external opening, which is often by no means commensurate with the internal extent.

From what has been before enlarged on, it will be evident that any of the substances that act by their causticity may be introduced to promote a removal of the diseased surface, and a more healthy action of the remainder, or, according to the farriers, to "*core out the quittor.*" Crystallized verdigris, corrosive sublimate, butter of antimony, arsenic, solutions of potash, and lunar caustic, are all in use for this purpose. One circumstance is self-evident, which is, that humanity as well as prudence dictates that we should use the mildest means first. These too often fail; but in every instance where the sinuses can be reached by a syringe, the cure should be attempted by injecting for a few days with a tincture of cantharides in turpentine (see *Liquid Blister*), or a mild solution of caustic alkali or lunar caustic, introducing pledgets also, dipped in the same, by means of a probe. But if these fail, it will be prudent to proceed to the use of more active stimulants. When the upper opening is very small, and the sinuses deep, but contracted, make a paste with equal parts of resin and sublimate, softened with tar. Impregnate small pieces of wool fully with this paste, which place around the end of a probe, and introduce one by one, to the bottom of each sinus, filling also each up to the orifice with the same, but not jamming them in with force. When, on the contrary, the superior opening is sufficiently large, and one or two straight sinuses only exist, a bougie may be made with paper, dipped in the paste, and introduced; or in case the diseased action be extreme, and, as a farrier would express it, the quittor is very *foul*, a powder composed of equal parts of resin, sublimate, and verdigris, may be rolled within thin paper, so as to make also a bougie, which being greased or rubbed with tar to render it slippery, should be introduced to the bottom of the sinuses; but it must be remembered, that when these are numerous and irregular in their direction, the first is by far the best mode. The hoof should be thinned, and may also be put into a poultice; and, in some cases, where there is a very extensive separation of horn, and the direction of the quittor extends completely from above downwards, a removal of that portion of hoof, with a drawing knife, is proper, by which the diseased surfaces can be exposed and dressed: but under no other circumstance is an extensive removal of horn prudent. In two or three days after the introduction of the caustic, there will follow great heat and tumefaction of the foot; and, at last, the orifice will burst out, expelling the slough, together with the application that occasioned it; after which it may be expected that the wound will go on healthily to heal. If however, unfortunately, this should not be the case, recourse must be again had to another introduction of escharotics, and which plan must be persisted in until the amendment be apparent.

CANKER.

[Fic, ou Crapaud.

Canker is, equally with the former, a very obstinate and destructive disease, and may commence in any of the vascular parts of the foot; but the perfect character of the complaint, and its future progress, consist in a separation of the horn from the sensible parts, by a suppurative process, together with a sprouting of a luxuriant peculiar fungus from all the secreting surface that is exposed, and which fungus is found very difficult to keep under. The disease may be brought on in various ways. A very common origin is from neglected thrush, in which the suppuration, extending beyond the sensitive frog, inflames the vascular sole, and extensive ulceration succeeds. Virulent and neglected grease will sometimes occasion it, and in both these ways it is frequently engendered among heavy cart horses; particularly where many stand together in crowded and confined situations, as those of coal-porters, brewers, &c. &c. Here they become greased and thrushy from wet and neglect, and canker soon follows. It often likewise arises from pricks, and when such an injury extends to the flexor tendon, and canker is the consequence, it is commonly of the worst kind; though more frequently the unfortunate animal, under such circumstances, is previously cut off by locked jaw, or by the hectic arising from the extensive sloughing. Treads, bruises, or bad corns, may now and then likewise occasion it. It is but seldom met with in the fore feet, and when it does occur in them, for obvious reasons, it proves more manageable. It does not often, like quittor, extend to the bones, cartilages, and capsular ligaments; but confines it principally, except when the flexor tendon be wounded, to the vascular frog and sole. Now and then however, either by its own violence, or by bad management, it does extend even to the bones of the foot, which it renders carious, eroding the ligaments both capsular and connecting; in which cases it will be most prudent to destroy the animal.

Treatment of Canker.—The principal indications appear to be, first, to reduce the inordinate increase of parts to a level with the surrounding surface; and, next, to restore the healthy secretions. When the fungus extends itself considerably beyond the horny opening, it is prudent at once to remove it to a level with that by the knife. This will occasion a considerable hæmorrhage, which may be checked by touching it lightly with muriate of antimony, or other escharotic; after which, the edges of the horny sole that surround the opening from whence the fungus arises may be got at. Proceed carefully and accurately to examine what extent of sensible sole is separated from the horny; or, as a farrier would say, how much is "*underrun*." Exactly to this extent must the sole of the hoof be removed with a drawing knife; for it must never be lost sight of, that the horny sole once separated never reunites, but becomes a foreign body, and, as such, occasions the same effects that occur from the presence of foreign bodies in all other parts, namely, irritation and an inflammatory process to attempt the removal of the offending substance. Every portion, therefore, of separated horn must be carefully removed. Not only must this be done in the first, but at every future dressing the same attention should be paid to examine if any fresh "*underrunning*" have occurred; or, in other words, whether the suppuration have extended so as to dissolve the continuity between the sensitive and insensible horn of other portions, which, in such case, must be treated in the same way, by a judicious removal of all the detached parts: and as the presence of the horn occasions irritation when it becomes detached *generally*, so any immediate portions of the edges of it that project do it more *particularly*; therefore it should be always cut away neatly and evenly, and no rough edges or prominences suffered to remain.

Having thus fulfilled the first indication, by reducing the diseased fungus, and having lessened the irritation that occasioned it, by removing the detached horn; the next process is to promote a more healthy action in the diseased surface: two plans tend to this end—the first is, by *stimulants* applied to the surface of the vessels particularly; the second, by *pressure*, which strengthens them generally. As long as there is a profuse secretion of a curd-like whitish matter; and as long as the fungus sprouts greatly beyond the surrounding parts; so long the *cankered* action is going on, and, during this time, no secretion of firm horn will take place. An unhealthy formation of thin half-formed horn may be observed over many portions of the surface; but this will prove an imperfect secretion, and must not be allowed to remain; on the contrary, it must be continued to be carefully removed at each dressing, until, by the application of escharotic stimulants, and the benefit of pressure, a healthy granulating surface appears, that will produce only an ordinate and proper quantity of good pus or matter, and finally end in the formation of sound horn. After the exposure of the whole cankered surface therefore, and of its treatment as before directed, let it be sprinkled with either of the following powders:—

No. 1.—	Red oxyde of mercury (*red precipitate*) .	half an ounce,
	Acetate of copper (*verdigris*)	ditto,
	Calamine	ditto.

Mix.

No. 2.—	Vitriolated copper (*blue vitriol*) . . .	one ounce,
	Alum	ditto,
	Carbonate of lead (*white lead*)	ditto.

Mix.

Being lightly covered with either of these, or any other escharotic stimulant judged proper, let it be dressed as dry as possible, by first laying lint on the immediate surface, and then placing pledgets of tow thickly over the bottom of the foot, which should be done very judiciously, so as to fulfil the remainder of the indication; that is, to keep up a firm and equal pressure. To do this effectually, having filled up the whole cavity of the sole, introduce thin strips of iron or steel, slid under the shoe and crossing each other, which will retain the dressing and promote the pressure. This being done, wrap up the whole in thick sacking or hose, so as to keep the foot perfectly dry, which is of the utmost importance, as nothing so tends to the increase of the fungus and the exclusion of the suppurative process as moisture: nor does any thing so strongly prevent its future increase, and restore the healthy action, as dry applications, united with firm and regular pressure over the sprouting surface. A very great fault is often commitetd by dressing cankered feet too seldom. No case ought to be dressed less frequently than every day; and very bad cases should be opened twice a-day. From a wish to avoid trouble, this is often neglected, and a cure that might be quickly performed, is needlessly protracted; and, in the end, proves less complete than it might otherwise have been: for when the dressing is delayed, every thing that has been done is rendered nearly useless by the pent-up matter extending itself under other portions of the sole, and by the increase of the fungus.

Keeping in mind the beforementioned indications, the practitioner, at each future dressing, can be at no loss how to proceed. The luxuriant and diseased slough or fungus must always be first removed, not only to produce a level surface, but also to procure a complete view of the parts underneath; for it proves often a most insidious disease, and misleads unless carefully watched: sometimes, while one part heals rapidly, another is extending as fast, and a third remains stationary. The destruction of the fungus, when very high and luxuriant, may be effected, as beforementioned, most conveniently by the knife; but, when not so prominent, it may be done by the application of any of the caustic and escharotic matters generally used. Muriate of antimony is very commonly applied for this purpose; and as it can be laid on every part, and between interstices, by means of a small brush, where a dry substance might not reach; so, in this respect, it is preferable. It has also another advantage, which is, that, by turning the surface immediately white, it shews what parts it has been applied to, and what are left undone. The lapis infernalis, or caustic potash, from its quick action, is also a convenient application. I have likewise used a solution of lunar caustic, but the application of the same in substance is not sufficiently quick to be useful. The caustic dressing, be it what it may, should be continued no longer than there is any diseased surface remaining; nor should the escharotic process ever be pushed to the extent of corroding deeply into the substance of the vascular parts. Such conduct betrays the grossest ignorance, and therefore can hardly be expected in the veterinarian; but it has happened, in the practice of smiths and farriers, to the utter destruction of the foot. Yet, on the other hand, until the cankered matter, from being profuse, thin, and clotted with white masses, change to a thicker, less fetid, and more healthy discharge, as well as lessened in quantity, the sore is still a *cankered* one; and until the cauliflowered white fungus change to a healthy red granulated appearance, the unhealthy discharge must continue: and, in all such cases, a due degree of pressure, united with the application of some escharotic, milder or stronger according to circumstances, may be considered as requisite. But as soon as the fungus is completely reduced, the discharge lessened in quantity, and become healthy in quality, with a sprouting of healthy horn apparent, then nothing more is necessary than to watch the parts, to dress dry, and sufficiently often; still keeping up a moderate degree of pressure till the sore be completely healed over. Horses are often turned out during the process of cure of canker; but as the foot becomes unavoidably exposed to moisture, it is hardly ever admissible, unless under circumstances of a very dry season and situation; and even then, particular care is necessary to guard against occasional moisture, by a more extensive application of defensive dry dressing.

FALSE QUARTER.

[Faux Quartiers.

This can hardly be considered as a distinct complaint, but, more properly, as a consequence resulting from some one of the former diseases; in which, from the injury done to the coronary vascular ligament at one immediate part, it can never afterwards secrete horn in a perfect line of continuity; but the break or interruption which first originated between the old and new horn continues to be propagated. Such a blemish is called a *false quarter;* and it is evident that it must greatly tend to weaken the hoof. It likewise sometimes produces the same unpleasant effects as a sandcrack, by admitting the vascular laminæ between the opening, and, by a sudden approximation of its sides, squeezing them, to the extreme pain of the animal. The *Treatment* can be only palliative. In cases where it is *likely to happen*, thin the horn thoroughly, and apply a blister: but when already formed, keep the horn of the part always thin: use a bar shoe, and "*lay off*" (as a smith calls it) that quarter; that is, the portion of crust immediately under the blemish must not rest on the shoe. This may be done either by paring the foot, or by an indentation in the shoe; the choice of which is left to the prudence of the operator, with this exception, that, in a weak thin foot, the alteration should always be made in the shoe.

OPERATIONS.

OF SHOEING GENERALLY.

EVEN without the assistance of history, it would naturally suggest itself, that the ingenuity of mankind would be early employed in discovering some mode of counteracting the effects of pressure and abrasion on the feet of such horses as they had domesticated; for, as commerce and the liberal arts became encouraged among them, so the necessity of forming more easy communications with each other by means of paved tracks or roads presented itself; and which, as they occasioned an unnatural wear of the feet, it became necessary to counteract the effects of by some artificial defence. In very early ages*, a species of sandals were made use of for horses as well as men, which were formed either of leather, of matting, or of rope; but it appears that these were only in *occasional* use for horses. Xenophon, who commanded the cavalry of the Grecian armies about five hundred years before Christ, and who wrote expressly on the subject of horses, mentions such a defence for their feet in use in his time. In Columella and Varro, who were subsequent writers, we have additional evidence of this. Two hundred years after these, Apsyrtus, a famous veterinary writer who lived in the reign of Constantine, gives express directions for the treatment of bruises and galls of the shank, brought on by the thongs or fastenings of the *foot shackles (ippopedes)*. At later periods, these shackles were strengthened by plates of metal, which, in general cases, were probably of iron, but, on occasions of great magnificence, appear to have been sometimes made of gold; as, we are told by Pliny, were those used by the mules of Poppæa:—

> "Et supenum animum in gravi derelinquere Cœno
> Ferream ut Soleam tenaci in voragine Mula."—Catullus.

But as riding, and the use of chariots, became more general, so some means for obviating the inconveniences of the inapt modes of fastening the defences for the feet then in use, presented themselves more forcibly; yet it is probable, that it was not until some centuries after, that the present method of shoeing with iron plates, and attaching the same by means of nails, was practised. Vegetius, who lived in the reign of Valentinian the Third, though he accurately enumerates every thing connected with an army forge, makes no mention of any apparatus for shoeing horses, nor any artificers for that purpose. And from Beckman we learn, that the first account of the modern horse-shoe that can be relied on, is gathered from an account of the furniture of the Emperor Leo, of Constantinople:—

> "Ferra lunatica cum clavis eorum."

But the use of shoes of this kind was very confined at this period; nor did, perhaps, any horse continue to wear such altogether, but now and then only; nor was it until long after their introduction, that the use of them became general. Père Daniel, in his ***Histoire de France*** of the ninth century, informs us, that the horses of his country were only shod in times of frost, or on very particular occasions. The art of horse-shoeing appears to have been brought into ***England*** by William the Conqueror, having been previously some time practised among the northerns, who were skilful artificers in iron; and among whom the adapting of shoes to the feet of horses appears to have been considered as a very important matter; for we are informed, that this puissant monarch appointed Henry de Ferrers, a favourite who came over with him, superintendant of the shoers; and from hence the future Earls of

* There is a learned work, written by Professor Beckman, expressly on the antiquity of horse shoeing. Mr. Bracy Clark has also a very ingenious chapter on this subject, to which I would refer the inquisitive reader.

Ferrers, his descendants, have always borne six *horse-shoes* in the quartering of their arms. But, neither in England, nor in any of the continental countries, did the art make a progress at all equal to its importance. It is true, that many writings, expressly on the subject, were produced; and French, German, Italian, and Spanish, treatises on shoeing, of very old date, are to be met with: there are a few English also, but which are mostly borrowed from the French. Nevertheless, when the celebrated La Fosse began his career, the practice of this art was but clumsily managed; and his well-known writings on this subject appear to have first paved the way for the improvements that followed.

La Fosse's Shoe.—La Fosse considered long heavy shoes as useless, and liable to be torn off; that they lessened the points of support, and that thick shoe heels were no assistance to weak-heeled hoofs: he was hence led to recommend what he called the half-moon shoe, which was short, and reached only to the middle of the foot. This method was considered at the time as very ingenious; and his treatise on the subject was translated into our language both by Bracken and Bartlet, who each recommended the plan it taught, and from which its use became pretty general. La Fosse's shoe has been found useful in many cases of diseased feet: it is very applicable to *strong* feet when contraction is likely to take place or has begun, provided such horses be not worked on very hard roads. But his plan is not *generally* applicable to the majority of horses in the present state of our roads, for the heels are found to wear too fast: in hunting, horses slip with it; and, in draught work, it is still less admissible. This shoe, or one something similar to it, was also first adopted by Mr. Coleman, but, not being found to answer, these becoming apparent, it was very soon abandoned. But with all its merits and defects, the half-moon shoe was not La Fosse's invention: it had been used for contracted feet more than a century before, but had never been brought into general wear; yet as it was found a *remedy* for contractions, La Fosse deemed it might, by general use, *prevent* them also; and hence it is probable arose his adoption of it.

But the present mode of horse-shoeing in France differs very much from that recommended by La Fosse, and as widely also from the plans in use among us. The French shoes present no fullering, but the heads of the nails, which are square, are received into a countersink. Eight of these nail-holes are punched into the surface of each shoe, at equal distances round the anterior part; the last nail-hole on the outer quarter being at somewhat a greater distance from the heel than the inner. Neither are these nail-holes so near the outer rim as with us; but their inclination within the iron is so directed, as to carry the nail more perpendicularly than in our shoes, and thus the danger of puncturing the sensible parts of the foot is avoided. The web is equal in thickness throughout. Thus far the French mode presents much to recommend it; and thus far I agree with Mr. Goodwin, that we might advantageously borrow from them; but when it is known that their shoe is convex on the ground side, and concave on that which is applied to the foot, placing thereby the animals which wear them pretty much in the same situation with an unhappy cat shod with walnut-shells by unlucky boys, I must totally dissent from him. Yet this very form the French term the *adjusting balance;* and this plan of shoeing, with some modifications (but among which a level surface of contact is not one), Mr. Goodwin, in an elaborate and ingenious essay on shoeing, endeavours to introduce among us.

Osmer's Shoe.—Mr. Osmer was originally a surgeon, who, having turned his attention to veterinary medicine, introduced many improvements. His *Thoughts on Shoeing* were offered about 1760. The shoe he recommended was to be made quite flat on the under surface, of an equal thickness throughout its outer margin; and to prevent its pressing on the sole, it was to be seated; that is, bevelled away, not from the edge, but from about half its width, by which means it would leave a flat surface for the attachment of the crust. His further directions were, that every shoe should stand wider at the heel than the foot itself, and that every foot should be kept as short at the toe as possible, so as not to affect the quick.

Mr. James Clark's Shoe.—Not very long after La Fosse and Osmer had awakened the attention of the public to shoeing, Mr. Clark, of Edinburgh, published his excellent treatise on this subject. This gentleman's shoe did not materially differ from the one recommended by Osmer, and which is that in use among many of the most intelligent of our farriers at present: but his remarks more forcibly painted the improprieties generally practised. It is plain likewise that Lord Pembroke borrowed many of his ideas from him. Mr. Clark's principles rested on recommending no unnecessary paring or cutting either of the hoof or frog; nor did he allow of raising the heels with calkins, except in hilly countries, when security was required from slipping in frosts, &c. &c.

Monsieur St. Bel's Shoe.—In consequence of the situation which this gentleman held, every attempt he made at improvement excited the public attention; and though he was certainly not well informed with regard to the general pathology of the animal, yet he possessed many excellent ideas on the mechanical arrangement of the foot, and his principles of shoeing were ingenious. The late professor's shoe was intended to present a concave surface to the ground, that would more closely imitate nature, which mode he offered as entirely new; and though it is possible he considered it as such, yet the same form was as strenuously recommended three hundred years ago, in a treatise written professedly on the subject by Cæsar Fiaschi, an Italian. There is no doubt but that this mode of shoeing appears more consonant to the *natural* tread than any other, and therefore presents, *at first,* the firmest support to the under surface of the foot; but unfortunately it will not remain in this state long, for this thin edge will soon wear down, by which means the iron becoming thin will also become weak, and thus prove liable to bend or break. If shoes could be so formed as to be at once ductile and yet durable, we might then advantageously use this pattern. The breadth likewise of Mons. St. Bel's web was less than that of the common shoe, and it was directed to be half as wide at the heels as at the toe, which rendered it doubly erroneous.

Mr. Morecroft's Shoe.—This ingenious professor of the veterinary art rendered himself eminent by his invention of casting shoes, or moulding them by means of machinery, which was done by sinking them in dies: but the plan was not found to answer, and the ingenious inventor lost some thousands by the experiment. Nothing can prove sufficiently tenacious but a shoe worked by manual labour. Mr. Morecroft, in consequence of the good effects he observed it to have upon feet in general, and from the simplicity of its form, recommended Osmer's seated shoe, which, as we have described, was one with a flat surface opposed to the ground, but a concave one towards the sole, by which means all chance of pressure was avoided; but this concavity did not, in Mr. M.'s shoe, begin near the edge, as in the common shoe of country blacksmiths, but towards the centre, or from rather more than half of the width, by which means a flat surface was left as a seat for the crust. The heels were likewise directed in his treatise to remain the general width of the web. This shoe was also adopted by General Bloomfield, who was chief director of the Prince Regent's stables, and whose known capability of judging in these particulars rendered this adoption an additional proof of the general excellence of the plan. Mr. Morecroft's principles and practice of shoeing came before the world in a well written treatise, in which the advantages resulting from the use of this shoe are detailed, and in which also some novel and ingenious remarks on cutting appeared.

The Shoe of the Veterinary College.—The shoe first used by the Veterinary College was that recommended by Monsieur St. Bel; but when the present ingenious Professor entered on his situation, he adopted another, which did not greatly differ from that of La Fosse; a more extensive experience, however, convinced him, that this improved shoe was not found applicable to British horses subjected to British travelling; he was therefore led to adopt another, and which has given rise to much discussion, and has been both much condemned and much advocated. The *College Shoe* is three times as thick at the toe as at the heels, the wear being three times as great there as at the heels; by this form also the frog is brought in contact with the ground. It is likewise much lighter than usual; for it is observed by Mr. Coleman, that an ounce at the heels is more than a pound on the back. This shoe is, therefore, recommended on three principles: first, that by its use, the wear at the toe will be equal to that of the heels; secondly, that the weight will be diminished; and, thirdly, that the frog will come in contact with the ground, which the Professor thinks essential to the well being of the foot. It is left plain on both its surfaces, and in its application, the toe should be pared down, but the heels left undisturbed; by which means the thinness of the shoe heels will not influence the horse in his tread. In Mr. Coleman's admirable work on the foot we are also informed, that when the heels of the foot exceed two inches in depth, with a frog equally prominent, and the ground dry, a *short* shoe, and thin at the heels, may be applied: but he does not recommend this shoe in wet ground. With regard to the nails, they are to be applied as near the toe as possible, with none at the heels; for when they are placed far back, they bind the foot in its action, and tend to contract it. The nails of the College Shoe were originally conical, and the nail holes stamped with a wedge-like punch, which farriers call countersinking; by which means, so long as any part of the base of the nail remains, the shoe is held firm. A shoe and nails, for a moderate sized horse, should weigh from eighteen to twenty ounces; and the web may be an inch wide at the toe, and three-fourths of an inch at the heels. For a light saddle horse, the weight should be from twelve to fourteen ounces, and proportionally less wide. Cart horses should have an extension in breadth and thickness according to their size. In horses which hunt, or those used in shafts, it is proper that the outer heel be turned up; and that there may be no inequality of position, the outer heel of the hoof is directed to be lowered, and the inner heel of the shoe somewhat thickened, which will prevent cutting, and yet allow the horse a firm support. The Professor recommended a bar shoe for horses with low weak heels, as it produces pressure on the frogs without further wearing of the horn, and, when they are sufficiently grown, then the thin-heeled shoe may be used.

The Patent Artificial Frog.—Mr. Coleman, convinced of the necessity of *pressure* to the frog, when he entered on his labours, invented also an apparatus for this purpose, to be applied in those cases where, by bad shoeing, or by disease, this part had become elevated from the ground; in which cases, if the heels were sufficiently lowered to bring the frog down, the tendons would be, as it is termed, strained; and to wait for the growth of the frog would only increase the mischief already brought on. The *patent frogs* were therefore intended to produce *pressure* on the *natural* frogs while in the stable, by which means the evils arising from the want of it would be relieved, and, in time, the proper shoe might be used.

The Patent Expanding Shoe.—Mr. Coleman also adopted a shoe for the prevention of contraction, having at the inside of each heel a clip, bent down to embrace the bar, by which it was presumed the tendency in the foot to contract would be mechanically prevented; and would take on a disposition to diverge also, the heels of the shoe being bevelled outwards. But notwithstanding the extreme ingenuity of this, and indeed of all the plans invented or adopted by Mr. Coleman, much yet remains to be done: the subject is altogether an intricate one, as will ever be the case when we oppose art to nature; and it is less perhaps to this difficulty than to palpable defect in the plans, that they have not superseded other inventions. Different views, however, of the principles, strike different persons; and as long as truth only dictates the inquiry, this difference is both usefully and laudably stated. Mr. Coleman's principles of shoeing rest much on the importance of the frog as an agent in resisting contraction, to fulfil which intention this part must actually meet the ground whenever the foot is set down. To effect this, therefore, both the shape of the shoe and the horn of the foot must be altered. But when treating on the anatomy of the foot, I have endeavoured to prove, that this is not the principal use of the frog; and on the subject of contraction, I have attempted to shew, that other causes than the elevation of the frog from contact with the ground are principally active in bringing about this evil. If, therefore, the importance of this organ, in this particular, be once overthrown, then the advantages contemplated by this form of shoe become lost, and, on the contrary, it becomes hurtful; for it either forces the horse to stand on an uneven surface, or there must be an unequal weakening of the foot, by a partial paring; and it is self-evident that few can bear the latter, while the former is injurious to all. It may be asked likewise, Are not the flexor tendons in danger of being put unnaturally on the stretch? and as a lesser evil, and one more remote, Is not the frog also capable of injury by this extra wear?

Mr. Bracy Clark's Paratrite.—The known talent of this gentleman, and his long attention to the subject of shoeing, induce me to pay great deference to his opinions; but I cannot let this respect lead me aside from pointing out, in an open manner, what I conceive to be erroneous in principle or practice, whenever I meet with it: I ask of others only the same candour I shew to them. In Mr. C.'s elegant work on the foot, he informs us that he became by degrees convinced that the diseased alteration, that so commonly takes place in the feet of horses, was not occasioned by any of the numerous causes to which it has been usually attributed, as confinement, heat, wear, improper paring; nor even is it materially influenced by what has been called bad shoeing. But, according to Mr. C., *contraction*, or a *diseased alteration* in the feet, is a necessary consequence of all shoeing, good or bad; because, by the operation of the nails, this otherwise expansive organ becomes placed within a fixed machine, whereby its natural functions are almost wholly destroyed. This reasoning is illustrated by some experiments detailed in a candid and able manner. To obviate these evils, this ingenious author invented a shoe which he called the *paratrite*, 'by which the wearing point or line of abrasion of the 'hoof is defended, without the necessity of the application of nails, 'and, in general, not requiring the aid of a mechanic.' It is evident that the reasoning adduced to prove that contraction of the hoof is a necessary consequence of all shoeing, good or bad, where nails are made use of, is imposing; neither can it be denied, perhaps, that all shoeing must, as an inevitable consequence, tend to deteriorate the foot in a small degree, but not to the degree of consequent destruction is still more apparent. Were the confinement of the foot from the effect of the nails the sole cause of contraction, it would operate on all horses shod, and in proportion to the time they had been subjected to it. Likewise, if this took place at all in the ratio of Mr. C.'s experiments, no horse at twelve years old but must be completely foundered. But, on the contrary, universal as is the evil of contraction, it is still very common to meet with horses with wide open feet at twenty years old, and who have been shod seventeen years of the time. If also all shoeing, good or bad, contracted the feet, and that the other alleged causes were really inert, then we should meet with no difference between the feet of those horses used by farmers and other persons in the country, and those belonging to the inhabitants of large cities, who confine them wholly to the artificial habits of the stable; the reverse of which is too clear to need more insisting on. Further, it is indisputable, that although the foot be *fixed* by the nails, yet in good shoeing, where they are placed principally forward, it is but a small portion of the expansive part of the foot that is operated on by the confinement; and for the other part, the fixing it to its original standard, one might suppose *à priori* would, by preventing a recession of its walls, operate as favourably in this respect as any other evil occasioned by it could act unfavourably. One other proof is still more conclusive, which is, that a stabled horse *without shoes*, if managed in the usual way, and exposed to the usual causes of contraction, becomes affected, I think, nearly, if not quite as readily, as one with shoes on. Mr. C., I believe, asserts quite the contrary, and I make no doubt but that he draws his conclusions from facts; but I suspect they were only occasional ones; for I have *repeatedly* seen contraction began by confinement, heat, and a want of paring, where shoes had not been worn for some time previous.

A rational Form of general Shoe, and the Method of adapting it to the Foot.

The experience of nearly thirty years has convinced me that it is not easy to overturn the various inventions and improvements introduced by the wisdom of ages; I have, therefore, and I think wisely, rather contented myself with adopting that which presented itself as the least ineligible in general practice, to inventing any other of doubtful utility and of difficult application, when removed from the sphere of the eye and personal direction of the inventor; by which I have also spared myself the mortification of seeing the darling child of my hopes hastening to the tomb of all the Capulets, where so many children of splendid promise rest forgotten. It is also much to be regretted, that so much ingenuity and research have been wasted, when reflection might have prompted the self-evident truth, that the vast variety of contending circumstances will ever prevent any one definite form of foot-defence becoming applicable to every foot, and therefore adapted to be offered as a standard pattern. On the contrary, this, like every thing of human invention, must bend to circumstances. The general *principles* of the art are already fixed and known to be those that allow as little departure from nature as these circumstances can justify. The *practice* also should be strictly consonant to the principles, and both must consist, first, in removing no parts but those, that, if the *bare* hoof were applied to *natural* ground, would remove of themselves; secondly, in bringing such parts in contact with the ground (generally speaking) as are opposed to it in an unshod state: and, above all, to endeavour to preserve the original form of the foot, by framing the shoe thereto, but never altering the foot to the defence. Nevertheless, as an artificial surface for travelling renders some departure necessary from otherwise natural principles, so it becomes the duty of the prudent veterinarian to render such deviations as little injurious as possible. On these principles I am led to recommend the following form of shoe, which does not very materially differ from that in use in the best forges about London: with the modifications I have introduced into it, it will, I think, be found as universal in its application as any apparatus can be that is to be applied to so important and so variable an organ as the foot. I have myself used it for my own horses for many years, and it has been most extensively used by others, by my recommendation, with satisfaction to the owner and advantage to the animal.

This Shoe should have the web of one width around the whole circumference, and this width should be rather more considerable than is usual, with the nails as far removed from the heels as they can be with safety to the attachment; to strengthen which, and to make up for this removal from the heels, these nails should advance more around the front of the hoof than is generally done: but that the fullering may not by this means weaken the iron of this part, and also because most horses wear principally here, so every shoe should be steeled at the toe. Not only should the web be rather wider than usual, but it should also have rather more substance or thickness than common, except in very light hacknies, or horses used on turf, sand, or other light surfaces. This shoe is not to be set so wide at the heels as is usual, by which these parts are left unprotected. So that the shoe heels stand wide enough to allow for the growth of the foot not to draw the points within the crust, it is sufficient. This will be still more certainly prevented, and the inflections will be more perfectly protected, if the shoe heels project rather more, that is, if they are longer than ordinary, which I think advisable, except for hunters, or horses who travel in very clayey soils, or those who overreach or interfere. To an animal so strong as the horse, the addition of *weight* of one or two ounces to each shoe is very inconsiderable; but this addition to the *support* and *protection* of the foot is very material. Had the majority of horses perfectly healthy well-formed feet, and had the greater numbers of them only moderate work on level roads to perform, then a shoe altogether lighter in weight, and less in frame, might be sufficient. But it is to be considered, that there are very few feet met with but what have undergone some unfavourable alteration which makes them somewhat sensible to the effects of concussion; add to which, a great proportion of the horses in general use are worked, at least occasionally, very hard, and often on very bad roads. It is therefore, under all these circumstances, that I have considered this as the most proper shoe for general use. I have, at various times, tried all the others; but I have found the generality of horses go best in one of this kind. Very sound young feet, particularly where the work is moderate and the soil light; or where it is seen the horse treads very lightly, either from his size or other circumstances, may render some variation both convenient and proper; but to a foot in full work, on hard roads, this shoe will be found the best that can be worn. In thin-horned feet with flexible weak heels, and in those tender from incipient contraction, it is indispensible, and the only one that can be properly applied. The recommendation with regard to the heels standing less wide than is usual, is so directly in opposition to the common method practised, and to the ideas entertained on this subject, that I shall lay myself open to animadversion: but whoever will attentively examine a shoe "*well set off*" at the heels, as it is termed, will find only one-third of the surface, sometimes hardly that, protecting the heels; the remainder projects beyond, and serves no purposes but those of a shelf to lodge the dirt on; a convenient clip for another horse to step on; or a more ready hold for the shoe to be forced off by in clayey grounds. Nor are the heels sufficiently long for the protection of the foot in the generality of shoes, and which defect, more than a want of width, causes the tendency for them to press on the crust of the heels. If a shoe be suffered to remain on an improper length of time, no form can guard against the evil; but if it be removed sufficiently often (and I am directing a shoe for wear and not for contingencies), no chance of the heels ever getting within the crust can occur. If the decreased width of the standing of the heels, and the increased width of the web, should make the inner angle of the shoe heel in danger of interfering with the frog, the corner may be taken off.

Nothing has been hitherto said on the popular subjects of seating and bevelling. I have used this shoe entirely plain, and I have used it seated, both outwards and inwards. Some conveniencies, and some inconveniencies, attend each of these modes. A shoe perfectly plain on both surfaces, or nearly so (for all are something thinned towards the inner edge), is most easily formed; and, in giving directions to a country smith, this would puzzle him the least: but this shoe could be only applied with propriety to a foot whose sole was sufficiently concave to admit of its descent, without interfering with the shoe, and without pressing on occasional lodgements of dirt, which are more likely to remain upon this flat upper surface than on one seated inwards. In soles at all tending to become flat, a seating over two-thirds of the inner circumference of the shoe is absolutely necessary; and as its make gives it a tendency to throw off the dirt and stones from lodgement, so this is the form of shoe to be generally recommended: add to which, by this seating, the shoe is rendered lighter. An outward seating, according to the plan of M. St. Bel and some later practitioners, presents at first sight an appearance of following nature, and of giving a surer support by a more pointed pressure downwards, with an equally stable support upwards; and if we could make shoes at once ductile and durable, this would, for all well-formed feet, be an excellent mode: but, unfortunately, this outer rim soon wears down, and the expectations raised relative to its utility are not fulfilled; and, what is worse, the shoe must either be rendered improperly thick, or this loss of lower rim will weaken it. Whenever frosty weather, hunter's shoeing, or heavy draught work, makes *calkins* necessary, the utmost caution is required to avoid elevating the outer heel *only*, as is sometimes done. If two calkins be not used, at least thicken the inside heel to an equal height with the outer. It now only remains that I mention one other caution, which is to be observed equally in every shoe; that is, that both marginal surfaces should be *perfectly level;* nor should any shoe be put on that has not been critically tried on a *plane iron*, which should be purposely kept in every shop. Were this examination made on every shoe, we should not have the barbarous and destructive custom of a thick clubbed heel exactly applied to, and pressing on, the weakest part of the foot, as is too generally practised, even in forges where we should expect to find a better mode of operating.

Having thus described the *shoe*, I shall now proceed to point out the proper method of preparing the *foot* for the application of this or any other shoe in common use. The operation is, of course, commenced by pulling off one old shoe; for it is better never to take more off at once, if it can be avoided, otherwise the horse is apt to break away the edges of the horn while standing so long bare on the pavement. In removing the old shoes, great care is necessary that the clenches be first thoroughly raised, so that the crust may not be torn, or portions of the nails left within the horn. This being done, the rough edges of the crust should be rasped, which prevents its breaking away when set down, and detects any stubs of old nails left behind, as well as removes loose portions that would hold gravel, and turn the edge of the drawing knife. The next process is to thoroughly pare the sole throughout, until it can be what is called "*thumbed*," or felt to spring by a forcible pressure of the thumb. In this paring, the natural form of the arch of the sole should be as closely imitated as possible, and particular care taken that no part of it be left to protrude beyond the line of the crust; on the contrary, its concavity ought to commence immediately from the line of separation between the crust and sole, but not from the edge of the crust, as I have seen done. The whole thickness of the crust, be it more or less, ought to be left perfectly flat for the bearing of the shoe. Habit, and a correct eye, can detect any inequalities in this surface, without a momentary application of the heated shoe to try the bearing parts, as is usually done; and which, if the shoe be also previously tried with a plane iron, may very well be avoided, although the outcry raised against this practice is, in a great measure, unnecessary; for, unless the shoe be very hot, and held on too long, no harm probably results from its application. In common rough shoeing, also, this error is infinitely less than the application of the unequal pressure which it is intended to prevent would prove. The portion of sole between the bars and quarters should be always pared out; and, if properly done, is the surest preventive against corns. The heels should be an object of great care, and ought to be carefully reduced to the general level: in no instance must they be left high; but, when any tendency to contraction exists, they should be kept still lower than common, so as not to put the flexors on the stretch. It is also of consequence that the inner heel should never be reduced beyond the outer: if by bad wear, or by bad management, it be observed to have become the lowest (as is too often the case), encourage its growth by taking none away at the paring, and also by laying the shoe but lightly on it. A want of attention to this circumstance of inequality in the heels, lays the foundation for corns and splents. I have yet made no mention of the frog, which is, in general, almost the very first object of attack as soon as the knife or butteris is taken in hand; but I would, on the contrary, recommend that the sole, crust, and heels, be first attended to, and then a mistake in paring the frog is less likely to arise: for it may be regarded as a general rule, that when the frog is on a level with the returns of the heels, and with the crust, it is as large as it ever ought to be; the heels of the shoe will raise it sufficiently for protection against too much wear, but will not elevate it beyond a proper share of pressure. Smiths, likewise, are sometimes apt to leave a large uneven portion at the point, which presses painfully against the centre of the foot; this should be avoided by gradually tapering it away like the natural growth: but all unnecessary cutting and trimming of the frog should be studiously avoided; and when it is below the general surface, then nothing should be removed but the mere ragged portions which harbour dirt and moisture. Almost every smith is impressed with an idea of *opening the heels*, which, with them, is nothing more than cutting away the edges of the inflections of the hoof, where they turn to form the horny heels, and are continued under the names of bars or binders. In contracted feet these inflections sometimes press inwards, and actually squeeze the frog; from observing which, smiths cut away the extreme edges of the pressing part; and as, in such cases, this practice is observed to give some relief, so it has become a principle in their minds that it is a salutary process to every foot; and as it leaves a momentary appearance of widened heel, it is not possible to convince them but that a *real* enlargement of the posterior part of the foot is the consequence. It is hardly necessary to remark that this practice is founded in the grossest ignorance, and that, instead of eventually opening the heels, it tends permanently to contract them, by weakening the bars; the practice should therefore, in every instance, be forbidden, except as before mentioned, in cases where the heels *bind in* so much as actually to press the frog between the horny edges, when it is justifiable to relieve the immediate pressure by cutting out the binding portions of the inflections; but it must not be forgotten in this case, that the remedy is only palliative, and more permanent means should be adopted for the future prevention of the evil. (See *Contraction;* see also *Anatomy of the Foot.*)

We will suppose the under surface of the foot pared, and a shoe applied, having a perfectly flat surface of its own, and being placed upon as true a surface of the horn. In such case many nails are not necessary, nor need they be large: it is also of consequence that they be not driven too high up into the horn, as is too often done; neither need they, in common cases, be hammered so hard, or the shoe be so much tightened, as I have seen done. It only therefore remains to remark, that, whenever there is the smallest tendency to contraction, I would strongly recommend that, after the shoe is applied, the hoof may be thinned a little, exactly in front, from the hair to the toe, by means of the rasp. This part may be regarded as the centre of contraction, and its being moderately thinned in one narrow surface, of an inch in breadth, will not in the least weaken the foot, but will operate very favourably in both preventing and reducing contraction. Its action, in this respect, may be exemplified by the common practice of thinning the back of the toe nail, when it has indented its edges within the flesh, which this thinning instantly relieves, as certainly as the occasional repetition of it afterwards will prevent a recurrence of the evil.

The *hinder Shoes* should, when well formed, be a little squarer at the toe for an inch of their circumference, to which shape the hoof is also to be brought by rasping, avoiding to do it injuriously. By this mode a more steady point of bearing is afforded to the hinder feet, in the great exertions they are often called upon to make in galloping, leaping, &c.

An *improved Shoe* might be suggested of the following construction, which would embrace the benefits of the English and French methods. Its advantages would, however, only be striking where the same operators were constantly employed; or where others as tractable and ingenious were sure to be met with. This improved shoe might present a flat surface towards the ground, and a concave one towards the sole; but this concavity should not occupy, as in the common seated shoe, three quarters of its breadth, but something between a half and two-thirds of it, leaving by this means a sufficient surface for the crust, and sufficient strength of shoe. This bevelling also should not reach to the heels, but should leave them plane, as an even support for the heels. The advantages of this seating are, first, that as the crust rests on a flat surface instead of an inclined plane, as most of the shoes forged in the usual manner do; so its position is maintained entire, and the inclination to contraction in the foot is frustrated. The nailing of this shoe should be exactly after the French method, being formed with conical nail-holes, punched with a square countersink, into which nails, square and conical, should be adapted, exactly filling the countersink, by which means an eminent advantage would be gained; for so long as any portion of the base of the nail remained, the shoe would be held firmly. These holes might likewise follow the French plan of being less oblique and more within the rim, by which the danger of pricking in shoeing would be lessened.

Of *the varieties* which necessarily occur in the form of shoes, as the *bar shoe*, *frost shoe*, &c., it is unnecessary to enter on here. It is the principles of the art we profess to teach, from which the application of it, in its various modifications, becomes easy.

Of Surgical Operations,

AND THE VARIOUS RESTRAINTS IT IS SOMETIMES NECESSARY TO PLACE THE HORSE UNDER FOR THEIR DUE PERFORMANCE.

WHEN it is necessary to perform any painful or unpleasant operation on so powerful an animal as the horse, it is of consequence to secure both him and ourselves from the effects of his resistance, by subjecting him to a *restraint* equal to the occasion. Horses are very unequal in their temper, and bear pain very differently; but it is always prudent to prepare for the worst, and few very important operations should be attempted without casting. To give directions on such minute points to the experienced veterinarian, might perhaps seem unnecessary; but as this work is intended as a guide to the inexperienced and junior practitioner, so I shall not *always* prove uninteresting or uninstructive when I descend to these minor matters. Humanity should be the fundamental principle of every operation, and we ought always to subject this noble animal to pain with reluctance; but when circumstances absolutely call for it, we should carefully avoid an unnecessary infliction of suffering. The resistance of the horse is terrible, and it is but common prudence in the veterinarian to guard himself against the effects of it. The *lesser restraints* are various: among them may be first noticed the *twitch* and *barnacles*.

The *twitch* is a very necessary instrument in a stable, though, when very frequently and unnecessarily used, it may have the ill effect of rendering some horses violent and vicious to resist its future application. In many instances blindfolding will do more than the twitch; and some horses may be quieted, when the pain is not excessive, by holding the ear in one hand, and rubbing the point of it with the other. A firm but soothing manner will often engage the attention and prevent violence; but it is seldom that either threats or punishment render an unruly horse better. Inexperienced persons guard themselves against the hind feet only, but they should be aware that some horses strike as truly and as terribly with their fore feet. It is prudent therefore, in all operations, to blindfold the animal, and the more so, as by this he becomes particularly intimidated, nor will he often strike without an aim. *Barnacles* are a sort of clams used by smiths, into which they introduce the nose in the manner of a twitch. They are only admissible when a person is so situated as to be wholly without assistance. When one of the fore feet or legs requires a minute examination, it is prudent to have the opposite one held up; it is, in some cases, tied up by a noose: and when one of the hinder legs is the object of attention, the fore feet of the same side should be held up, as, by this means, the animal is commonly prevented from striking, by the failure of his lateral support. If this precaution be not taken, still observe to keep one hand on the hock, while the other is employed in what is necessary, by which means, if the foot become elevated to kick, sufficient warning is given, and the very action of the horse throws the operator away from the stroke. Without the use of these precautions the practitioner will not only expose himself to much risk, but a neglect of them is sure to subject him to a suspicion from those around that he does not know his business.

The *Trevis*.—This is the very utmost limit of restraint, and is very seldom used but by smiths to shoe very violent and powerful horses. Whenever recourse is had to it, the greatest caution is necessary to bed and bolster all the parts that are likely to come in contact with the body. On the Continent I have seen horses very dexterously shod in this machine, and apparently put in under no other necessity than either to avoid labour, or, ridiculous as it may seem, to prevent the clothes of the smith from being injured or dirtied by the common method. Many horses have been destroyed by the trevis, or, at least, their aversion to the restraint has been such, that they have died under their own resistance; it should therefore never be used until every other method has been tried in vain.

The *side-line* is now very generally used, not only in minor operations, but also in those more important. Many veterinarians seldom use any other restraint than this, in which they consider there is safety both to the horse and to the operators. It is particularly applicable to such horses as are disposed to strike behind; and consists in placing a hobble strap on one hind leg, and then passing the end of the rope attached to it over the withers, bringing it back again under the neck, and over the other portion, so as to leave a slipping collar, as it were, round the neck, by which the hinder leg should be drawn forward as far as it can without elevating it from the ground. By this displacement of one leg the horse is effectually secured from kicking with either. Occasionally it is thus applied:—Hobbles are put on each hind leg, and the rope is passed through each of their rings or D's. Carry this rope, as in the former instance, over one of the shoulders and around the breast, along the body, and having again carried it through the hobble rings, pass it once more around the breast. Now draw both hind legs rather forward, and the horse will be secure.

Casting.—It is the practice with many veterinarians to perform almost every surgical operation by means of the restraints of the twitch and of the side-line, abandoning the operation of casting almost wholly. I was formerly so wedded to this method of securing a horse, that I seldom performed any important operation without it; but a more extended experience altered my opinion, and latterly I made use of it less frequently than I used to do. The objections to it arise from the dangers incurred, not only while forcing the horse to the ground, but also from his efforts after he is down, which not unfrequently are such as to fracture some of the vertebræ. In these cases a snap is heard, the horse's struggles cease, or at least moderate; and after the operation, on attempting to force him up, he is found to be helpless, or, if raised, he is incapable of proceeding, and is usually obliged to be killed on the spot. The chances of such a mortifying occurrence have prevented its being had recourse to so much as formerly; and when custom has familiarized the practitioner to the twitch and side-line, the change is a proper one. There are operations, however, which cannot judiciously be performed by any other method. Mr. Bracy Clark has simplified casting, by inventing some patent hobbles, having running chains instead of ropes, and which, by a shifting D, makes the loosening of any one hobble, for the purpose of getting at a particular leg, unnecessary. These are now still further improved by Mr. Budd, so as to render a release from all the hobbles at once practicable. Hobble leathers, and ropes, should be kept supple and pliant with oil, and ought to be always examined previous to using: nor should the D or ring of the strap be of any other metal than iron. Brass, however thick, is brittle, and not to be depended on. To this D or ring of one hobble, in the common method, a very flexible strong rope is well fastened by a noose, and, according to the side the horse is to be thrown on, this hobble is to be fixed on the fore foot of the contrary side, and from that to the D of the hind foot of that side, then to the other, and, lastly, through the D of that on the other fore foot. After this, much of the ease and safety of the *throw* depends on bringing the legs as near together as possible. This should be done by gradually moving them nearer to each other, without alarming the horse, which will very much facilitate the business, and is really of more moment than is generally imagined. A space sufficiently large should be chosen for the purpose of casting, as some horses struggle much, and throw themselves with great violence a considerable way to one side or the other; and this particularly if the feet have not been brought near together previous to attempting the *cast*. The place should be also very well littered down, first with dung, and next with straw. The legs having been well put together, the assistants must act in concert; one particularly should be placed at the head, which must be carefully held throughout by means of a strong snaffle bridle; another should be at the hind part to direct the fall, and to lay the horse on the side which is requisite. Pursuing these directions, the animal may be at once rather *let* down than *thrown*, by a dexterous and quick drawing of the rope, the whole assistants acting in concert. The moment the horse is down, the rope must be fastened; and particularly, the person at the head must keep that secure, for all the efforts to disengage himself are first begun by elevating the head and fore parts; but it is necessary to keep some soft padding under it, or he will rub the eyelids bare by his struggles. Great care is also to be taken that the horse be allowed to breathe freely when down; and that no more time be wasted in the operation than is absolutely necessary, as many horses continue to struggle throughout, and waste themselves much.

CASTRATION.

Much difference of opinion exists as to the proper *time* of castrating colts. Bulls are often *cut* at eighteen months or two years old; but it is observed that they grow larger, and fatten sooner, when it is done at ten or twelve days after birth. They prove to have less ferocity also, and more activity. In colts it is sometimes performed at three months, at others it is deferred till twelve months: this latter period is, however, objected to by some breeders, because they think the animal has not sufficiently recovered the check experienced from weaning before this new one arrives. In the more common sort of horses used for agricultural purposes, it is probably indifferent at what time the operation is performed, and three months, if the weather be not hot, is as good as any. But when the breed is prized, and any considerable expectations are formed on the colt, it is commonly prudent to wait till twelve months. At this period he should be accurately examined, and, if his foreparts appear correspondent to his hinder, proceed to castrate; but if he be not sufficiently grown *up* before, or if his neck appear too long and thin, and his shoulders spare, he will assuredly improve by being allowed to remain *whole* for six or eight months longer. Some of the Yorkshire breeders do not cut till two years, and think their horses stronger and handsomer for it. The fear in this case is, that the stallion form will be too predominant, and a heavy crest and weighty forehand be the consequence; perhaps, also, the temper may suffer. Young colts require little preparation; but those of more mature growth should be bled and lowered in their system; and a time should be chosen when the temperature of the atmosphere is neither too hot nor too cold, as of 60°.

Method of Castrating.—Having cast the horse on his left side, secure the off or upper hind leg with the flat web part of a halter: it is convenient to keep a flat piece of hempen tackle, with a running noose, for this purpose. This must completely secure the leg before the hobble is removed from it; after which the leg is to be drawn forward, by means of a web collar around the neck, in the manner of the side-line, and then carefully fastened. And here may be seen the advantage of hobbles with a false or screw D, as described in casting, by which all danger from loosening may be avoided. Having every thing in readiness, grasp the scrotum firmly with the left hand, and with the right make a section towards the pending part of the bag by a neat flexion of the scalpel, through the integuments, and of sufficient length for the testicle to protrude itself through. Grasping the testicle with one hand, with the other push the scrotum back, so as to expose the spermatic cord, on which fasten the clams sufficiently tight to prevent its slipping, and then dissect or cut away the testicle, leaving a small portion of the cord without the clams for searing. To this end of the cord, while held by the clams, apply the firing iron, sufficiently hot to produce an eschar that will stop the bleeding, but not, as is frequently done, so hot as to burn it to a cinder. Having finished this, proceed to make another section, and to remove the other in the same way. I used to dress the parts after the operation with mild spirits, or the common tinctures, which may be done or not at pleasure; but of late years I have only applied some dry lint, placed a little within the edges of the divided scrotum, and this merely to check the bleeding from its edges, which, in older horses, is often considerable. In colts, no dressing at all is required, nor any kind of bandage; neither is any bandage desirable in more adult horses, as it is apt to get stiff, and become difficult to remove; it also alarms the horse when attempted to be taken off, yet tender and fearful from the recollection of the pain.

In this operation the principal cautions requisite are, first, the necessary force required to hold the clams without wounding or materially bruising the cord: if it be held very tightly, more inflammation often follows than we could wish; and even the portion of cord held, sometimes sloughs off. If it be not held sufficiently tight, still greater evils may ensue; which are, the escape of the cord into the cavity of the belly before searing, and an alarming hæmorrhage. Among *Veterinary Instruments*, may be seen an improvement in clams. The next caution is in the searing, but which is of less importance than the other; that is, it would be better to sear too much than too little, because, when it is not done sufficiently, in a few hours the force of the spermatic artery will overcome the eschar, and hæmorrhage will ensue. On the contrary, if it be causterised too strongly, inflammation is sometimes apt to make its way up the cord, and to delay the healing. In many cases, after castration, not a single unpleasant symptom arises, but the horse will eat, drink, and even exercise himself without difficulty or apparent pain; and such is generally the case with colts of whatever age; for which, therefore, only common precautions are requisite. But, in adult horses, considerable swelling and inflammation often follow, and to such a degree as to make it prudent to bleed and give a mild purge; the parts also may be fomented with warm Goulard water; and if the inflammation be very considerable, insert two rowels into the thighs. Mr. White says all precautions of this kind are unnecessary, and that nothing more is requisite than to scarify the swellings by numerous punctures with a lancet, by which means the deposited fluid will flow gradually away. To assert that no precaution is ever necessary, is, I think, wrong, and may mislead; for although this mode of removing the tumefaction may be very proper where the swelling is unaccompanied with much heat and irritation, yet I have seen cases where much more was requisite, particularly in old stallions; for, in some instances, the pulse is much quickened, and the swelling that appears is phlegmonous, and will yield no fluid if punctured. Under such circumstances the plan I have laid down is not only prudent but necessary. When much swelling follows the operation, common farriers reccommend trotting the horse about, but this should never be done; on the contrary, in all cases of adult castration, the horse should be put into a loose box, and not exercised till the third or fourth day, unless the legs swell very much, and the horse appear otherwise but little affected, when a little gentle walking may be allowed. The food should be moderate, as hay and mashes in winter, and in summer green food, if it can be got. Now and then, but not often, sinuses, and ill-conditioned sores, will form in the scrotum. In such cases the cavities must be syringed with the mild liquid blister, which will readily promote a healing process after the first application. It remains to observe, that the plan in use by some "*gelders*" of castrating at twice, by means of caustic, with an appearance of little form or trouble, should neither be attempted nor sanctioned by the regular veterinarian, who should, on the contrary, pursue one steady course, founded on proper principles; in which case he will not be answerable for adverse circumstances, and will also be commonly able to combat them. In Algiers, instead of excising the testicles, it is customary to squeeze them in the colt state, in the same manner, probably, as Italian human castrati are made by their mothers. Tetanus is not an unfrequent consequence of this operation on the continent; but it is by no means frequent with us. I never met with more than one instance of it. This possibility should however make us particular not to operate under unfavourable circumstances, particularly of a heated atmosphere.

BRONCHOTOMY.

Cases may occur in veterinary practice when this operation is required; as in strangles, when the tumours threaten suffocation, or when an apple, potatoe, or piece of carrot, have slipped into the œsophagus, &c. &c. In a distressing case of gunpowder bursting immediately under a horse's nose, the effects of which tumefied his mouth and nostrils, so as to prevent free respiration, the animal owed his life entirely to my excising a portion from the tracheal rings, about six inches below the angle of the throat. The operation of *tracheotomy* is most simple, and may consist either in a longitudinal section made through two or three of the rings; or a square portion occupying about an inch square, may be excised from the anterior cartilaginous substance. A tube, if possible a flexible one, should be introduced into the opening, and retained there as long as possible. The operation has been also performed in cases of roaring, under an idea of dividing the stricture, which impeded respiration; but unless the exact situation of this were discovered, it would be but an uncertain attempt. When an opening is made into the upper part of the trachea, or larynx, it is called *laryngotomy*. This is not quite so simple an operation, and is very seldom requisite. It consists in dividing the integuments exactly opposite the cartilaginous box of the larynx (see p. 229), which will bring the cricothyroid ligament into view, which should be sufficiently divided, either to remove any offending substance, or otherwise to admit a respiratory tube.

ŒSOPHAGOTOMY.

The œsophagus may be divided purposely in cases of strangulation, from the obstruction of too large a ball, an apple, or from the accumulation of bran or chaff, which has taken place in greedy horses. In such case, as this tube inclines rather to the left side, the opening should be made there, and directly opposite to the obstructing matter. The section should be carried longitudinally or lengthways of the neck, which will be in the course of the muscular fibres of the tube. The carotid artery, the eighth pair of nerves, and the jugular vein, must be avoided, which, if the section be made with only common caution, is easily done: the œsophagus, which lies immediately above the air-pipe, being brought into view, may be divided longitudinally, and sufficiently to remove the obstructing matter. Being divided, it should then be stitched up again with the interrupted suture, making the stitches very superficial, and leaving the ends of the threads without the wound, which must then be closed, and every means of irritation avoided. For the first forty-eight hours both drinking and eating must be dispensed with, and this deprivation may be rendered less irksome by pouring two or three ounces of laudanum down the œsophagus, which will at once nourish the horse and damp the appetite: a little thick gruel may be given him every twelve hours afterwards, but it should not be forced down, as this would endanger the wound. Thirst might probably be altogether prevented by keeping him constantly with wet cloths around his body, by which moisture would be absorbed; and food may be principally supplied by nutritious clysters of broth and gruel, passed as far up the intestines as possible.

NEUROTOMY, OR THE NERVE OPERATION FOR FOUNDER.

Mr. Percivall, an ingenious veterinary practitioner, with much seeming propriety, having objected to the term *nerve operation* as inexpressive, has named it *Neurotomy;* and, as this is at once critical and explanatory of its import, it deserves general adoption. The operation itself is practised for the relief of lamenesses in the feet, principally of such as are dependent on a contracted or otherwise altered form of the hoofs (the pumiced hoofs excepted). The nerves having been long known as the medium of sensation, many cases of lameness in the feet occur, which render horses useless, principally from the pain and tenderness consequent on the pressure of some pedal parts long since altered by disease, but which are not now actively engaged in a disorganizing process. This very naturally led to an opinion that an interruption of the medium through which they received their sensation (i. e. the nerves immediately furnishing such feet) might, by rendering them wholly or partially insensible, materially remove the impediment, and fit them for useful employ. Such an opinion was entertained many years ago, and experiments to this effect were made by several ingenious veterinarians. More than twenty years since, Mr. Moorcroft informed me that he had, under this view, been dividing the metacarpal nerves above the fetlock. Similar experiments were afterwards made by Mr. Coleman and by others; but from a want of due attention to all the circumstances connected with it, the practice was not found sufficiently beneficial to warrant its continuance, and for many years it lay dormant and forgotten, until revived and improved by the ingenuity and research of the assistant Professor to the Veterinary College. When this operation was first practised, the *reproductive power* in divided nerves, although known, yet was not sufficiently taken into account; consequently as union quickly followed a simple division of their cords, and as sensation soon followed the union, so lameness was found again to recur. But as a knowledge of the functions of the nerves, but more particularly of the peculiarities attendant on operations upon them, became familiar to veterinary practitioners (see *Neurology*), so the reason of former failures started into view; and it remained for Mr. Sewell, by applying this knowledge to an amended mode of performing the operation, to perfect the discovery, and in fact to make it his own. But the success which attended its practice in the amended state, at first occasioned a too indiscriminate application of it, as well as in some instances an erroneous mode of performing it, both which proved unfavourable to its reputation, and it consequently met with much, and, under such views and practice, deserved opposition. At length cleared from these fetters, it begins now to assume its proper character, as a limited but valuable auxiliary to the veterinary art; and as such I shall enter into an examination and account of it as circumstantial as my limits will allow, and, to further elucidate it, I shall add Engravings, which will, I hope, be found an useful assistant to the junior practitioner.

To do equal justice to the art and to the artist, it may be as well to commence by pointing out the cases in which it has been proved to be inapplicable, and those in which it may be confidently expected to prove useful. Where there is reason to expect considerable disorganization of the internal parts of the feet, as ossification, or total absorption of the articular cartilages, or diseased alteration of the bones within the horny box, or where inflammation of the laminæ may have wholly destroyed their sensibility, or where the mucous capsules have, from disease, ceased to yield any, or but a partial supply of synovia; in all such cases it cannot be expected to restore the mobility of anchylosed parts, nor can it restore the lost organization; but even in such cases, when morbid processes are not actually going on, but seem stationary, and the animal is rather suffering under the effects of former than of present disease, it has, by rendering the animal less susceptible to the pain of pressure, enabled him to move and exert himself with more ease to himself, and more benefit to his owner. But when an active state of disease is going on, particularly when inflammation is still present, although much disorganization may not have yet proceeded to any great length, or when ulceration of the articular cartilages is suspected*, it is not prudent to apply it. Neither is it advisable when the ravages within the feet have been very considerable from any or all the causes above noticed:—on the contrary, in such cases, by removing sensation and rendering the animal willing to exert himself more than the state of the parts will allow, great aggravation of the disease has sometimes followed. For, as has been ingeniously remarked, the naturally acute sensation in the feet is kindly given as a guard to their over-exertion, both in health and under disease. Neither has it been found at all applicable to that state of feet, which at first view appear to have taken on a disease exactly the reverse of founder, that is, where the hoofs instead of becoming preternaturally high, hard, and lessened in diameter, appear expanded in circumference, but flat, thin, and soft, particularly in the sole, which, from a concave form, has become flat or convex. In these cases, called *pumice-footed*, the operation is, I believe, invariably hurtful. Neither can it with propriety be recommended in any case until the various means of relief, particularly of that just treated on, have been ineffectually tried; but when this or

* I use this term because by it is understood a disease of frequent occurrence, and which consists in a diseased alteration of the structure of the articular cartilages, but which I believe is seldom accompanied with the true characters of ulceration: on the contrary, it appears in many instances a sudden attack on their articulary surfaces, which certainly alters their structure sometimes superficially, sometimes more deeply, but is commonly unattended with real ulceration.

others, according to circumstances, have failed with the exceptions before insisted on, neurotomy has been found to render many foundered and otherwise foot-lamed horses not only useful, who were before nearly useless, but it has rendered them nearly as perfect in their mode of going as ever. Some have hunted, many have made excellent roadsters, and all have been fitted for carriage-work of every description. The testimonies of this kind detailed in the respective public communications of Mr. Sewell, Mr. Percivall, and Mr. Goodwin, to which I would recommend the inquisitive reader, will remove any scepticism on the subject.

The importance of a due acquaintance with the structure and functions of the various parts of the animal body, are in few instances more exemplified than in the operation under consideration. To experiments on the functions of the nerves we were indebted for the hint, that their division would promote ease to a distressed animal and benefit to his owner; and to a more extended field of inquiry into these important matters, we owe the means of rendering this benefit permanent. The physiological facts connected with this subject are detailed under the head *Neurology*. It is here only necessary to remind the veterinarian that the metacarpal nerve passes in company with the metacarpal artery and vein down the canon, protected from danger by the flexor tendons to within a short distance of the fetlock (see *Angiology)*, where it divides into two branches, one of which passes on each side of the pastern at its lateral and rather posterior part (see *fig*.1, *p*. 653). A little anteriorly to it, and rather more superficially placed, may be seen the artery, and anterior to that the vein, which here take the names pastern nerve, artery, and vein. In the natural subject the nerve is usually more contiguous to the artery than it is in the plate, for the sake of clearness, drawn. It is also a little within or under the artery sometimes, a situation which renders it, from the pulsation, most easily found. As the nerve passes over the fetlock on each side to gain the hollow of the pastern, it gives off a considerable ramus, which furnishes the upper and anterior part of the foot. To keep the main trunk clear and not to confuse the vein, this branch is not brought into view in the plate. To save this branch from division, and to keep the nervous influence entire in the front of the foot, which is in general cases of founder the least affected by disease, Mr. Sewell prefers to operate below the fetlock instead of above as was first practised, and as is still so done by many. In ring-bone, however, it is evident that this reasoning does not apply; on the contrary, the division of this branch is peculiarly important, and in such cases the operation should invariably take place above the fetlock. Although it seems from these and other reasons which follow, as well as from the extensive experience which Mr. Sewell has had, that he prefers to practise in general cases the lower operation; yet it must be allowed that no great differences have been observed between the ultimate success of the division, whether operated above or below the pastern. It is not, however, to be supposed in either case, that some nervous communication is not kept up by interlacing fibres, from superior branches; for, without this, the common life of the parts would be endangered, and they would be subjected to decomposition and decay. It would be most unphysiological to suppose that, because the motions of the feet were operated by tendons which received their muscular contractions from above, that therefore nervous influence was not essentially necessary for other purposes. On the contrary, in my mind, there is little reason to doubt, that when the hoofs have fallen off some time after the operation, as has happened in a few instances; it has arisen from some failure in the quantity or quality of these auxiliary nervous branches, which forms an additional reason for operating below the fetlock.

The disposition to keep up nervous influence is remarkably observed in the divided portions of nerve in neurotomy. If a simple division be effected, the ends first retract, but afterwards approach each other, and an interposed substance is placed between, which becomes organized, and transmits all the former powers of the nerve. This takes place in about six weeks. Even when a portion of an inch in length is excised from the nerve, the ends endeavour to approach each other, and, though unable to accomplish this, still sooner or later, sensation is transmitted by means of an interposed matter which forms a continuity. The period when this takes place is not definite; it has occurred in a few months, and it has taken three years to do it: it is said, in some few cases, sensation has not returned at all. On the return of sensation, it now and then happens that lameness also returns, but it is consolatory to know, that a repetition of the operation has wholly removed the secondary attack. When no lameness returns, there is reason to suppose that the disease itself is overcome, and facts have borne out the supposition. Some enlargement usually remains under the skin, from a thickening of the divided portions, which has been sometimes so considerable, as, in the high operation, to bring the part within the reach of the contrary foot in its elevation. When therefore it is wished to perform the division above the fetlock, it has been proposed, in order to avoid this inconvenience, to operate *above* on the outer and *below* on the inner side.

Fig. 1.

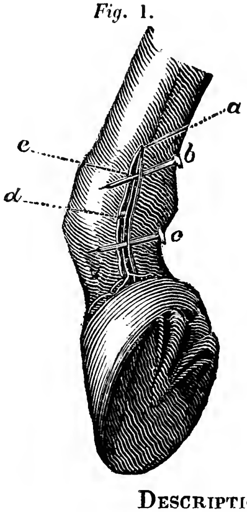
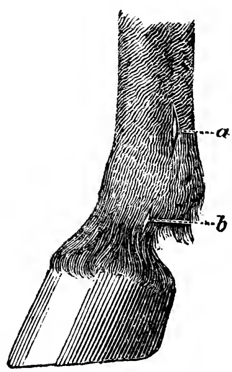


Fig. 2.



DESCRIPTION *of the* FIGURES.

Fig. 1*st*,—Represents an off fore-leg with the outer integuments removed.

a,—The inner pastern, vein, artery, and nerve, seen as soon as they have left their origin from the metacarpal vein, artery, and nerve; which at this part divide into the inner and outer pastern vessels and nerves: the outer vessels and nerve form the other bifurcation of these metacarpal vessels and nerve, penetrate the other side opposite to these, and proceed to the same destination, the foot.

b,—A pin separating and elevating the nerve, at which part also it is to be operated on in the higher operation.

c,—A pin separating, elevating, and shewing the nerve at the part where the lower operation is usually performed.

d,—The inner pastern artery contiguous to the nerve.

e,—The inner pastern vein anterior to the artery.

Fig. 2*d*,—Represents a leg with the integuments entire.

a,—The situation of the section through the skin in the high operation.

b,—The situation of the lower section.

Mode of performing the Operation.

The situation of the section through the skin being determined on, a guide to which may be gained from *fig.* 2; cast the horse, and having firmly secured the leg to be first operated on, shave, or otherwise closely cut, the hair from the part, which having done, and having ascertained the exact course of the artery by its pulsation, make a section in that direction, inclining a little behind the vessel, through the integuments, one and a half or two inches long. The cellular substance being cleared away, will bring the vessels into view, and the nerve will be readily distinguished from them by its whiteness. Elevating it from them, and from its membranous attachments, by means of a tenaculum, or by a crooked needle armed with thread, pass a bistoury under it, as near to the upper angle of the section as may be, and divide it; or when it is sufficiently detached and elevated, a pair of strong surgical scissars will perform the division even more conveniently. Then firmly holding the lower portion between a pair of forceps, and having detached it from all adherences, with the bistoury or scissars excise about three-fourths of an inch of its trunk. Having finished which, if both feet are affected, proceed to do the same with the contrary side of the other leg; after which turn the horse, and repeat the operation on the contrary sides of each leg as they come in succession, by which a more frequent turning of the horse may be avoided. The integuments may be now drawn neatly together, and either secured by slips of adhesive plaster, or by a few stitches; if by the former method, and they be properly secured by a light compress, it affords the greatest chance of promoting a union by the first intention. Tie up the head for a day or two, avoiding exercise, and keep the horse low. It has been recommended to give a dose of physic immediately; but as griping sometimes requires active exercise, this had better be avoided, and particularly as the bowels may be kept sufficiently soluble on bran mashes.

I cannot close this important subject without adding, that Neurotomy appears to open the door to other benefits beyond those of the relief of the feet alone. Consequent to this relief, have followed that the crippled stallion, previously worn down by pain to a condition unfitting him for producing healthy progeny, has afterwards again become vigorous, and the father of robust offspring. Mares also, who from the same causes have ceased to feel the periodical oestrum or horsing, after the operation have renewed their fecundity. It seems also to afford some hope in the tetanus consequent to a lesion of parts, by cutting off the communication between the part labouring under injury and the brain.

One case of this kind has occurred, wherein an early application of Neurotomy relieved the incipient symptoms of tetanus brought on by a wound in the foot. In the painful state of some cankers, when dressings are with difficulty applied, and exhaustion succeeds to continued irritation, it holds a reasonable prospect of success, particularly the lower operation. On which principle of relieving pain it has been lately likewise introduced into human medical practice on a more extensive scale than as a relief for tic doloureux.—See *Swan's Observations on the Anatomy, Physiology, and Pathology of the Nervous System.*

DOCKING.

It might be worth enquiry, whether this operation first originated in a supposition that, by excising a portion of the tail, the hinder quarters were thereby strengthened; or whether the inconveniences of a flowing tail to the rider or driver were the exciting causes. Even yet, in some counties, and among some particular horses, as those of stage waggons, an idea is entertained that additional strength is gained by a close curtailment of dock. Neither is it improbable, but that the blood intended for the support of the tail may, to a certain degree, find itself other channels, by increasing the anastomosing branches of the surrounding parts. I am not, however, advocating the cause of this custom; still less the barbarous and unsightly one of cutting the dock to within three or four inches of the rump; whose benefits are probably a *deceptio visus*, and estimated by the eye being at once carried over the expanse of croup and buttocks; whereas in other horses, the line of vision is broken by a dock of ordinary length. Neither is the custom of docking colts almost as soon as dropped, at all beneficial to the future growth of hair on the tail: on the contrary, I was informed by an intelligent breeder in Yorkshire, that the early docked colts had less hair even than others. It is also more than probable that the want of this natural defence renders the attacks of flies injurious to their condition in the following summers. I perfectly agree with those writers who advocate the cause of a longer dock, than it is fashionable now-a-days to leave our hunters, and some of our roadsters and carriage horses. Whatever appearance a short tail may have in making the thick-set round breed look "knowing," and more angular, surely it detracts greatly from the elegant lines of the better breeds, in whom contrast is not wanting, but rather a continuation of symmetrical lines. The length of dock must however be left to choice, but, being previously determined on, the long hair should be fastened back from that part, while about an inch or two below it should be shorn clear from surrounding hair. To this part the docking machine is to be applied, which removes it at one stroke. Various improvements have been attempted in the after treatment, such as ligatures by rope, tourniquet, pledgets, astringents, &c. for restraining the hæmorrhage. These are all now justly abandoned, and too often originated more in an affected sympathy, or wish for originality, than in a just estimate of feeling or consequences. A mild application of the cautery is unquestionably the safest and probably the most humane mode, as occasioning no necessity for after torments. As the cautery is however sometimes applied, it is cruel in the extreme, and certainly totally unnecessary. It is not unlikely that its violence is even sometimes productive of the tetanic state which occasionally follows docking, as well as of mortification also. We know that sloughing and an ill-conditioned state of parts are consequences of it. As the hæmorrhage would probably never prove fatal, and seldom injure the horse, there is still less necessity for it, or for a second application of the iron with melted resin over it. I need hardly hint, that the position in which the tail is held when searing can never influence the future carriage of the tail, though it has been thought to do it when held perpendicularly. In my own practice I always found a moderate pressure of the iron, heated only to a dull red heat, fully sufficient. Every practitioner is aware that from two or three coccygeal trunks only does much hæmorrhage flow with any considerable impetus. Might not these be fired with a budding iron separately, sufficiently to arrest the bleeding, leaving the minor anastomosing branches to restrain themselves?

If tetanic symptoms appear, operate anew without restraining the blood, the flow of which may be useful, particularly if accompanied with large doses of opium. (See *p.* 477.) If gangrenous appearances arise, warm terebinthinated dressings on the part, warm fomentations over it, and spirituous applications in the intermediate times, are the principal indications.

NICKING.

There can be very little doubt but this operation originated in a wish to prevent the inconveniencies resulting from the force with which a horse carried a long tail around him, to the annoyance of his rider. Tails were therefore first tied up in "stiff buckle;" they were then shortened or docked; and, lastly, from an observance that, under impetuosity, or stimulated by any excitement, the tail was elevated. Animation, which is but another term for beauty and grace, became inseparably connected in the mind with this rising of the tail, and artificial means were used to make such elevation constant in ordinary exertion. In a natural state, the depressing muscles of the tail are stronger than the erecting; and it is to overturn this, and to give the balance of power to the erectors, that the operation of *nicking* is practised. The introduction of blood horses into general use, has greatly modified the mode of nicking, and instead of three sections to form a perfect *nag tail*. The drooping pendent elegant curve of the blood horse requires but one. As in castration, so also with nicking, a seasonable time should be chosen for it. In cold weather, it may become checked in its granulating process; and in very hot weather, tetanus will be more likely to supervene. A temperature of from 55 to 60° will be, therefore, a very proper one.

The modes of securing the horse for the operation are various. Some few do it in the break or trevis; others place him against a strong bail, across a stall, or a leaping bar; which modes are practised by grooms and horse dealers, who are often very expert at nicking, and who seldom, if ever, cast a horse for the purpose. Professional practitioners, I believe, most of them, used to throw the horse for this operation: for many years I never operated without so doing; but I became averse to it from the difficulty of making the sections of equal depth, and likewise from the dangers of casting; but more than all, from every day seeing horse dealers performing it with the greatest ease and security standing. It should, however, be remembered, that unless the practitioner be very expert at using the side lines, and have all the necessary conveniencies, it will be safer for him to operate by casting: for want of these precautions, I remember, a few years ago, a horse dealer being killed on the spot while nicking a horse one Sunday morning in London.

Mode of operation.—The horse being properly secured (if by the side line, two had better be used), and a twitch being ready for both lip and ear, endeavour to gently place first one, and then the other hind leg, as far under the belly as the horse can bear with comfort, but not farther, or it will increase his disposition to resistance. If it be suspected that he will prove very obstreperous, or any timidity exist in the mind of the operator, as a further security, include both hind legs in another rope, or in a wide web, a little above the hocks. This may either run in a noose, or, which is better, let each loose end be attached to a manger ring, or, if operated out of doors, fasten them around the neck or across the breast. The tail having the hairs of the dock first bound together with wax end, &c., as the future means of attachment to the pullies, and also, if very full of hair, having it plaited back and secured, prepare to use a short stout scalpel; if double-edged, it is more convenient, and will save trouble in turning. The mode of making the sections must be left to the discretion of the operator, but the junior practitioner will find himself materially assisted by an accurate acquaintance with the anatomy of the tail, which may be gained by a reference to the *Myology*, p. 146; but much better by a few careful dissections. He will there see that the tail is neither conical nor perfectly cylindrical, but somewhat quadrilateral: its upper angles being formed of the fleshy bellies of the coccygeal elevators, and its lower of the depressors, leaving the under surface of the tail covered with ligament and skin only. It is of the utmost consequence to the junior operator that he bears this in mind, and that he does not penetrate further than the skin at this part, or he may divide the ligaments, and even penetrate the joint between one coccygeal bone and another, when anchylosis and a stiff tail would ensue. This latter accident may, however, be readily avoided by making the sections in the centre of a tail bone, which may be distinguished by the prominences of its articular surfaces; between which no such accident can happen. It is sometimes directed, and practised also, to make a section first through the integuments only, beginning at the roots of the hair on one side, and carrying it across the bellies of the depressor muscles; then doing the same by the other side; and, lastly, making these sections meet by a light and careful division of the integuments only, on the median line of the tail. Such is a very cautious and proper mode for the tyro, and is consistent with the best principles of the art; but it somewhat delays time, and the expert practitioner will probably find it more ready to carry his scalpel at once through the depressors, by a steady sweep, embracing all the parts to the median line, easing off the depth of section as he approaches it. By turning his hand, the same may be done on the other side, by which two strokes judiciously performed, the operation, in expert hands, is at once complete. This first section should not be nearer in the smallest horse than two inches and a half, and in a full sized three inches, or three and a half, as the centre of the coccygeal bones may indicate. If another section be wanted, make it at two inches and a half or three inches from the first and the third, if it be necessary, somewhat less distant than the others; but in blood horses, one or at most two sections, according to the fulness of croup and height of the sacral line, is all that will be at the present day required. In mares of whatever breed, one section less than for the horse is advisable. The most expert operator will, however, find it prudent, when the sections are made, to examine them carefully that they are all of equal depth, and have divided the depressor muscles completely. Should any difference appear in these respects, and should such unequal division be allowed to remain, the operation would be incomplete, and the horse would probably carry his tail awry. Add to which, any portion of the muscle being left undivided, would tend to prevent the others from retracting, and might also serve to promote a reunion of them. Having proceeded thus far, the hæmorrhage which ensues need not be considered as of consequence, nor will it shew itself until the tail be wholly relaxed; while it is elevated therefore, proceed to remove the tendinous ends, which will bulge out, not being retracted with the divided ends of their accompanying muscles. If one section only be made, they will be less prominent than when there are more; but enough will always protrude to enable them to be laid hold of by a tenaculum or forceps, and then cut off by a pair of strong and sharp scissars. The removal of these will not only separate the attachments of the muscles farther from each other, which, if reunited, would of course frustrate the operation, but their removal greatly facilitates the healing of the wounds.

The sections being thus complete, proceed to restrain the hæmorrhage, which is done in various ways. By some, by means of strips of cotton, tow, hemp, &c., which, twisted and inserted into each nick, are separately tied on the back of the tail. My own practice of late was to place a piece of lint on a pledget of tow, and introduce into each section, sufficient to fill it up, over which I placed linen strips long enough to tie, on the back of the tail, which were then tied sufficiently tight to restrain the hæmorrhage. Here also it behoves the practitioner to consider the principles of his operations. He purposely strangulates the tail to prevent a dangerous waste of blood, but the very action is an incipient death to the part, and therefore should be most carefully guarded against that it does not proceed too far. If the bleeding be considerable, and require the bandages to be made very tight, I usually loosen them a little in two hours, watching the wounds; but when these ligatures are not necessarily so tight, they may be allowed to remain all night, but should be snipped in two at the back of the tail in the morning, which will not disturb the tail: indeed, whatever the degree of stricture or tightness used in the application of the ligatures, as soon as symptoms of strangulation have commenced, less risk will be run by a too early than by a too late division. When the practitioner is on the spot, an examination of the tail may be made in the evening previous; and in case any re-action has commenced, and the tail is very hot, loosen or divide them at once on the evening of the day of the operation, when, if the re-action appear to be considerable, which will known by the tail becoming very hot, it will be prudent to divide them at once, and this more particularly if the operation have been performed early in the morning. Much difference of opinion has prevailed on the subject of dressings, and whether any medicament were proper beyond dry lint. If it were possible to promote the adhesive union, then a dry dressing would be the best; but when it is considered that an early and healthy suppuration is, in human surgery at least, thought to be some guard against tetanus, and as it will enable the dressings to be removed with less difficulty, so there can be no objection to any mild digestive being made use of, if it fall in with the view of the operator. Many of the best veterinarians, however, content themselves with simply watching the nicks, that they be kept clean and free from fungus or other unhealthy process, which, if they do not occur, they use no application but the bandages.

It is evident that, were a nicked tail left to itself, the depressing muscles would reunite, and carry it nearly as before: a suspension of the tail afterwards is therefore necessary to keep the divided ends of the muscles apart until a cicatrix be formed, and such junction thereby prevented. Various means have been used for this purpose: an ingenious one will be seen among the *Instruments*. Formerly the tail was fastened on the back, to the danger and torment of the animal. It is now suspended by means of pullies, the best of which are double. When one is used, one wheel is passed through a line stretched across the end of the stall, rather behind the horse, and through the other wheel the line to which the weight is appended. A more improved mode is used by means of two of these pullies, one of which is placed directly behind the horse, at some distance from him, through which, after passing through the pulley on the cross line, it is also passed. By these means, whatever be the motions of the horse, the tail is distended at a right line with the body. The weight used for this distention should be such that, for the first day or two, it will hardly keep the tail straight, or more than straight; for two or three more, elevate it to a little above the horizontal line, advancing it every two or three days to the required height, but which should never be carried perpendicularly erect. The elevation ought, however, principally to depend on the height to which we wish the tail to be carried in future. The carriage of the tail should therefore be examined every two or three days, bearing in mind that, after it has altogether done with the pullies, it frequently, indeed commonly, drops a little.

Among farriers and horse dealers, some difference of opinion has existed, relative to the propriety of exercising a horse during the use of the pulley, and also as to how long the pulley should be used; but these matters can never puzzle the veterinarian, being easily solved by a knowledge of the general principles of the animal economy, which alone ought to guide him. The pulley is only an extension of the tail, to keep the ends of the muscles from uniting again; but the simple extension does nothing of itself, as is foolishly supposed, towards the making the horse carry it in future. As soon, therefore, as the wounds are closed, or nearly so, then all benefit from the pulley is finished; but till then, of course, the muscular ends may unite, and frustrate the operation. Sometimes incrustation of the wounds will take place in ten days or a fortnight, and sometimes it will take a longer time. With regard also to the propriety of exercising the horse, there ought to be but one opinion. As the hair is, or ought to be, platted and carefully secured, so no inconvenience can arise, but every benefit may be gained, from letting him from the pullies, and exercising him gently to remove swelling, &c. &c. The hair being put on the stretch by the force used, so a great part of it usually comes off, and this will happen in spite of every precaution; but the longer it is kept in one immediate position, so much the more certain it is for much to fall off. At the end of five or six days, therefore, it may be untied or unplatted, combed out, and then tied afresh, being first greased at its roots; and the same may be repeated every three or four days afterwards, which is the best means I have found of preventing it from falling totally off.

Having thus carried the operation through its ordinary course, it remains to say somewhat of its irregularities. Occasionally inflammation follows the operation, either from suspending too much weight to the pully, or forcing it backwards; or otherwise from too long continuance of the ligatures, or too great tightness. This may proceed to mortification, or it may leave the tail with an unhealthy ulceration producing sinuses. When the former happens, the horse shews evident uneasiness the second or third day, the tail swells, is very tender towards the rump, and the heat is exeessive. If the dressings be removed, the wounds appear highly inflamed and tumefied; and unless this inflammatory state be arrested by the most active means, the wounds will become gangrenous, the stump will feel cold, and mortification will proceed towards the body, and either destroy the horse; or it is sometimes arrested at the base of the tail, and at length suppurates and drops off. In such cases the treatment must be prompt, and exactly those already detailed for active and important inflammations. As part of such treatment, remove it from the pullies, or only very slightly suspend it; wetting the tail frequently with cold water; keeping it continually so, will be found even more useful. It will also be a proper plan to apply cold water during the common process, whenever the tail is at all hotter than is wished. Another evil to which these cases are exposed is tetanus or locked jaw, and which is brought on by causes unapparent to us: in some instances, however, heat in the temperature of the air seems to operate on it. It makes its appearance in many cases about the fourth or fifth day, and occasionally later. As a precursor to it, the wounds occasionally assume an unhealthy aspect, and suppuration ceases. In other instances no such alteration appears; but in every instance, besides the general treatment of tetanic cases, the tail should be most actively stimulated, or otherwise really amputated, which perhaps would be the most proper.

CROPPING.

Custom has nearly abolished this worse than useless practice. Circumstances may, however, occur to render it necessary, such as one ear becoming blemished; therefore, at the makers of surgical instruments, we always find a sort of curved clams, called cropping-irons; into these one of the ears is introduced, and the upper part is cut off at one stroke with a knife of sufficient length: the portion cut off will serve as a guide for forming the other crop. A young practitioner is apt to be alarmed at the retraction of the skin from the cartilages, but the exposed edges disappear in a few days. Horses often continue for a long time very shy about the head by cropping; to lessen both bridle and halter also should be used, without a forepart or fronting, till the ears be well. The bridle should also be made to unbuckle at one side from the bit, so that the headstall may be dropped on, without the hand being raised to pass it over the ears. This will materially operate in dissipating the customary shyness that otherwise so long remains, and which is never wholly lost if force and cruelty be afterwards used.

PHLEBOTOMY, OR BLOODLETTING.

These terms, though not critically the same, are generally used as synonymous*, and signify blood drawn from any of the vessels of the body. The modes by which this is done are various. Blood is occasionally taken from the arteries: if the trunk be considerable, it may be punctured, but must afterwards be secured by a ligature around its trunk: if it be less considerable, it will be sufficient to divide the trunk of the vessel, which, having emptied all its ramifications, recedes, by means of its muscularity, within the integuments, which closes its sides, and stops the hæmorrhage. The temporal artery is occasionally opened in both these ways: it may be readily detected at three or four inches below the root of the ear, in a line with the nostrils. The angular artery is also occasionally opened in ophthalmia. Both arteries and veins are divided in making scarifications on inflamed surfaces, as those of the eyelids. *Bleeding at the toe* also abstracts blood from both arteries and veins. In drawing blood from the foot, nothing more is necessary than to pare the horny marginal line of the toe till the blood flows, which, from the great vascularity of the part, it will continue to do for a long time. Or a small opening may be made with the drawing knife immediately behind the line of separation between the sole and crust; by which means the plexus of vessels that surround the foot, called by the farriers the *vein*, will be wounded, and yield a large quantity of blood. Leeches are not usually applied to horses; in some cases, however, they may be used, as in ophthalmia: but perhaps emptying the vessels by a lancet applied to the surface of the cornea is a preferable mode. Bleeding in the mouth is seldom resorted to by the regular veterinarian; I know no good to be derived from it.

Phlebotomy is practised from any of the veins of the body, by means of a *lancet*, or otherwise of a *phleme*, which is forced forwards either by a spring† or by a stroke of any hard body, usually of a *bloodstick*. The large *horse* lancet, shaped like the human, but larger and stronger, is in general use: I would, however, recommend the practitioner to try the abscess-shaped lancet for bleeding, holding the circular edge farthest from the vein, and the concave downwards and nearest to it. When become expert in its use, it will be found the most convenient instrument. Some practice, however, is necessary before a person can bleed with any lancet, without making two punctures, one through the skin, and the other through the coats of the vein; and, without some

* Bloodletting may be practised as well from the arteries as the veins; whereas phlebotomy, in the strict application of the term, is abstracting blood from the veins only.

† Many attempts have been made to make spring phlemes, but I have never yet seen one which was worthy a place in the veterinarian's pocket.

experience, the vein is also apt to be altogether missed in attempting to do it by one. A little steadiness, and an indentation of the point of the lancet, which, after the indentation, should be carried obliquely forward, will ensure success. The bloodstick and common phleme may, however, if preferred, be very safely used, provided care be taken not to strike it too violently, and thus push the point through the opposite coat of the vein, nor strike otherwise than in the direct course of the vein. It is also prudent, when the phleme is used, to blindfold the eye on the side the blood is drawn from, or otherwise, at the stroke, the horse will start, and frustrate the operator. Practitioners are apt to be too indifferent as to the state of their instruments. Lancets and phlemes should be always sharp and highly polished, and, after bleeding, care should be taken to dry them, and to examine their points.

Any of the superficial veins of the body may be opened, but blood is more frequently drawn from the jugular, or neck vein, than from any other; the superficial vein of the fore, and those of the hinder extremities, called the plate and thigh veins, are also occasionally opened. In bleeding from the neck, the most convenient spot for the puncture is about two inches below the division or bifurcation of the jugular vein. (See *Anatomy of the Head.*) A ligature is seldom necessary: if the subject be in health, a little exercise will raise the vein; and if not, a pressure of the fingers of one hand is commonly sufficient, while the lancet may be introduced with the other; or, in case the phleme be used, the hand that holds it may also press the vein, while the other occupies the bloodstick. After a sufficient quantity of blood is drawn, apply the lips of the wound evenly together, and pass through them a small but sharp pin, but avoid pinching the integuments with the nail. Surround the pin with a little hemp, tow, or worsted; but, in doing this, do not draw the skin from the vein, which is apt to allow the blood to escape between the skin and vein, and occasion inflammation. In bleeding from the superficial veins of the fore or hind extremities, never use a phleme, but always the lancet, by which wounds of the fascia may be avoided.

In drawing blood it should be an invariable rule never to let it fall on the ground: it should not only be received into a vessel, but into one by which the quantity can be accurately judged: for which purpose, in every well regulated stable there should be a tin measure that will hold six, seven, or eight quarts, graduated into pints and quarts, into which the blood should always be drawn. It may be observed, that the quantity of blood taken away is, in general, too small. In a large horse, under any important inflammatory affection, particularly if it be early in the complaint, the first bleeding should not be less than from four to five or six quarts. In staggers and inflamed lungs, a still larger quantity may be drawn at the first operation. In all other cases not specified, or where nothing particular prevents, from two to three or four quarts may be taken, according to the age, size, and strength of the animal, &c. In all important inflammations it is of great consequence to draw the blood from a large orifice, and as quickly as may be. The increased action of the vascular system appears to be more readily checked by a sudden evacuation of blood; probably from a sympathetic effect, by which the vessels recover their tone by the hasty depletion. This mode of drawing blood appears to have the happiest effect in combating active inflammatory affections, and yet weakens the general strength less than when the process is slower.

Blood-letting is also both local and general. *Local bleeding* is practised immediately on, or very near, the affected part, and four ounces thus abstracted frequently does more good than a quart from the body generally. *General bleeding* is that wherein the system at large is depleted by the stores more immediately derived from the heart.

The *importance of abstracting blood* in veterinary practice is incalculable. From the extreme quickness with which most diseases of increased vascular action run their course in the horse, it is in many cases our principal resource. For allaying irritability, and lessening the momentum of the blood, it is our sheet anchor; and therefore principally to be resorted to in all irritative fevers, and all diffused inflammations; those of phrenitis, pneumonia, and enteritis, more particularly. In acute founder it takes more than its share of importance in the curative treatment, as well as in many other affections.

Blood-letting is also important as a criterion of the state of the disease; certain appearances of the abstracted fluid presenting certain indications of extreme importance to our treatment, which are fully detailed under *The Nature and Properties of the Blood*, p. 258. See also *The Pulse*, p. 153.

ON PURGING AND PURGATIVES.

A FARRIER of the old school would smile with no small degree of contempt and self-complacency, if he should glance his eye over the extent of the following detail. As to the all-sufficient groom, who "can carry a horse through his three doses of physic with any man in the world," he would wonder what the d—l I could find in it to talk so long about; and yet, if I blotted twice the number of pages, I should leave still much unsaid; so very interesting, so very important a subject is that of the *purging of horses*, to the animal himself, to the owner, and to his medical attendant. I remember when veterinary medicine first began to engage attention, by the establishment of a public seminary for its promotion, that no subject connected with it excited more discordance of opinion, than this popular one. Reasoning from analogy only, it was asked by the new inquirers, If a horse be already in health, can purgatives make him more so? Or when in health, can they secure him against disease? Neither could those who were educated in the human medical schools (as most of the early students and promoters of the art were) readily understand, why, when we wished to promote extraordinary vigour, present strength, and continued endurance of fatigue, with a more free and effective respiration, we should commence by the weakening efforts of repeated purges. Would it not, they inquired, be more accordant with theory and human practice, to expect all this from the stimuli of condensed nutriment, and increased exercise rather? Imposing as these analogical queries and arguments appeared at that time, they made but a short and feeble stand against the force of facts and the experience of ages, and the subject has now settled itself into an universal conviction, that the effects of purgatives on the human and on the horse are not altogether analogous, particularly as a promoter of that state of health which is termed condition. Certain peculiarities of constitution generally, and certain states of the alimentary canal particularly, render this process very salutary to the horse: they are indeed essentially necessary to keep him up to that artificial standard which luxury and refinement have taught us to expect in him. This subject is, therefore, a very important one to the veterinarian, and one that he should well understand, both popularly and scientifically. Popularly, or he may be convicted of ignorance by the humblest groom, not one of whom but supposes he knows every thing connected with the process. Scientifically, he ought to be most intimately acquainted with it, because it is not the same simple, easy, and safe operation as it is in man, under almost any management; but, on the contrary, it is a much more complex, difficult, and dangerous one. And although properly prepared, properly administered, and with proper treatment, it is not more useful than safe, yet, by being so often practised by grooms, stable men, and the dabblers in farriery, whose ignorance is usually equalled only by their presumption, scores of horses are yearly lost by it.

Theory and effects of purgation.—The principles of purgation are the same in man and the horse; but the products vary: thus it commonly requires twenty-four hours to produce complete catharsis in the horse, whereas two or three hours, and often less, will effect it in man. Speciality of structure produces this difference. The alimentary track is of immense length in the horse, and the surface to be stimulated into action is consequently of great extent; add to which, that the erect position of man is favourable to a gravitation of the abdominal contents, particularly of the liquid contents; but which the horizontal posture of the horse tends to retain. Cathartics act by stimulating the intestines to a more frequent evacuation of their contents; and they also increase the quantity of the matter expelled: under some circumstances they alter the quality of it also. A simple increase of the peristaltic motion of the bowels, will hasten the expulsion of the excrementitious parts of the aliments. A farther stimulus will not only so hasten them, that the fluid contents of the bowels cease to be absorbed, but the secreting surface of the intestines themselves will furnish fluid matter also. If stimulated still more, the biliary and pancreatic fluids are poured forth in greater quantities, and the alvine secretions are altered thereby. This being the simple operation of purging, it is evident how many erroneous notions are entertained relative to it; and more immediately that what has been termed *elective purgation*, or the giving of particular substances to purge particular humours, is wholly vague. Purging is used to reduce swelled legs: but no purge acts on the legs *immediately;* for it cannot, in the first instance, remove fluids from any other parts but from the stomach and bowels: but *mediately* it may remove them; for the removal of the fluids of the alimentary track puts the absorbents to work to take up the fluids from other parts to make up the deficiency, and thus the legs become lessened. From what has been stated of the operation of purging, it is evident how erroneous it is to suppose likewise that any *humours* are passed off in purging; or that hard riding is necessary previous to a purge to stir up these humours. A definite distinction has been attempted to be drawn between a laxative and a purgative; the former being characterised as merely the evacuation of the intestinal contents, and the latter as the increase of the secretion of the intestinal surfaces to supply an additional quantity of evacuated matter. As a means of expressing a greater or less degree of stimulus applied to the intestines (i. e. a weaker or a stronger purge), the terms laxative and purgative are useful and convenient: but as every degree of these acts is dependent on a *stimulus* applied to the bowels, whereby their peristaltic motion is increased, so nothing more definite can be understood to apply to them; and it is only in this sense they are to be viewed whenever they occur here.

The *uses of purging medicines.*—These are various, but may be arranged under—such as are given remedially against an *existing* disease; those exhibited as a *preventive* against a *probable* one; lastly, they are very generally in use for *promoting* a certain state called condition (see page 68).

Remedially, catharsis is most beneficially employed against inflammation, or almost all diseases of increased action, except of the alimentary track. By increasing the waste of the watery parts of the blood, it tends to deplete the system, and to lessen aterial action. In active inflammation it greatly assists bleeding, and in others it is superior to it, and can be advantageously employed when that cannot be with propriety attempted, as in fevers possessing a low or putrid character: for as such appear to be often dependent on some morbid change within, or some morbid combinations formed by the biliary fluid, which purging acts particularly upon; so its advantages here are striking. In the plethoric states, which produce serous deposits in the legs, &c. as in horses just removed from grass, &c. &c., we depend on purgatives for their removal. In pursive thick-winded horses, physic not only prevents further accumulation, but also stimulates the absorbents to take up some of the existing deposit. In dyspeptic cases, in hide-bound, in lampas, and others arising from deranged functions of the stomach, mild purgatives act in the most salutary manner. In the removal of worms also they act beneficially, by ejecting them and the nidus in which they are lodged also.

As *preventives,* purges are extensively employed also, when horses are taken from grass or straw yard, and are at once removed into a heated temperature, with clothing and a full diet. Were it not for bleeding and purging, but particularly the latter, we should find all the consequences of plethora shew themselves soon after; as hide-bound, surfeits, swelled legs, cracked heels, ophthalmia, and not unfrequently inflamed lungs also. Here, and in all similar cases, purgatives find a vent for the superabundant blood formed. It is another fact which serves to exemplify the want of analogy between the action of purgatives on the horse to those on the human subject, that when an emaciated horse is removed from hard work and harder fare, at once to rest and a full diet, that so far from his condition being improved, unless he be prepared for the change by previous purging, his skin becomes fixed, his belly still more and more tucked up, and his hair will often actually fall off. But the same change, when accompanied by a judicious use of purgatives, operates so much to his advantage, that a few weeks brings forth a new animal as it were. Physic is also most beneficially given at particular seasons, as at the spring and fall, to obviate the effects of the contradictory state into which horses fall at those times; being then apparently weak and emaciated, yet at the same time suffering from increased arterial action, employed in working the periodical change in the constitution. At these times two or three mild purges will stimulate the defective digestion, remove morbid accumulations from the bowels occasioned thereby, and, by a sympathetic effect between the skin and alimentary canal, they will assist in the change of the new hair for the old.

Purgatives are given to promote condition.—If their tardiness of action altogether shut them out from any other medicinal use, yet their beneficial influence in producing condition would, of itself, render the subject important to all those connected with horses. If, likewise, they excited only the condition we require on the young, the robust, and the already lusty animal, it would excite little surprise, and the *modus operandi* would be clear; but when we know that they equally promote it in lean emaciated horses, even without apparent disease, it requires an intimate acquaintance with the æquine functions, and his animal economy, to enable us to account for the fact. In such cases we give mild doses only, which prove a valuable stimulant and tonic to the stomach and bowels, thus promoting their digestive powers, and consequent capability of separating more organic moleculæ from the ingesta. They also stimulate the sluggish biliary and pancreatic secretions, which are so necessary to a healthy digestion and formation of chyle, from which alone the strength and bulk can be augmented. Luxury and refinement have introduced an artificial state of condition (*see p.* 62), beyond that simply implying a healthy functional state. Such condition is not only necessary to bring the animal up to our present ideas of beauty, but also to enable him to undergo exercises, which, in a state of nature, were not expected of him, as hunting, racing, &c. &c. To promote this state, purges are indispensibly necessary, and it is from this view that the subject of physicking derives its popularity with the mere horseman; though we have shewn that it derives no less consideration under every point of view connected with the well-being of this valuable animal. In promoting condition, purgatives not only act favourably on the digestive organs, but their beneficial influence extends to the other solid and fluid parts of the body also. By their means the watery parts of the blood are removed, by which the absorbents become stimulated to take up all the interstitial fluid interposed between the moving masses, as well as that distributed within the cellular membrane; by which means both the strength is augmented, and the weight of useless matter diminished. The unnecessary adeps or fat of the body is also removed by the same process, which allows the muscular fibres to be more rectilinearly placed, and to approximate in their action, by which a great increase in their power is gained. It is thus that physic draws up the belly and hardens the flesh. The lungs also are enabled to act more advantageously by the agency of physic, their capacity being greatly increased by the absorption of incumbering matter, either solid or fluid. In this way, the wind as well as the strength is increased by perfect condition.

The abuse and dangers of purgatives.—Salutary as is the operation of purgatives on horses judiciously managed, and properly timed, yet hurtful in the extreme and often fatal are the consequences brought about by an ignorant employment of them when not proper, and an erroneous mode of managing them when they are. In all inflammatory affections of the stomach and bowels, cathartics must be highly injurious, except in enteritis, when the obstruction cannot be overcome by other means. They are almost equally hurtful in inflammation of the lungs; and it is probable, from the powers it calls forth in the horse to produce purging, occasioned by his structural peculiarities, that in all great visceral inflammations active purges should be admitted with caution. In farcy and glanders, purgatives seldom do other than harm; and in chronic affections attended with great debility, they are only admissible in some particular instances specified in the treatment of such diseases. Physic is hurtful, however, principally from the frequency and quantity sometimes given. Grooms suppose that every ordinary case requires three doses of physic, the reasons for which Mr. Peall has humorously given, "The first being intended to stir up the humours," "the second to set them afloat," and "the third to carry them off." To very young horses, and to delicate feeders, the exhibition of three full doses of physic must be attended with most injurious consequences, and such as they cannot recover from for months, sometimes never. In such cases, one or two very mild doses are all that is required, or ought to be permitted; and it is doubtful, without some "foulness" as it is termed, or rather extreme fulness and plethora be apparent, whether, in ordinary cases, two moderate doses be not all that is necessary to ensure the condition of saddle and carriage horses. It is an unfortunate prejudice, engendered by ignorance and kept alive by obstinacy, that to do much good with physic it should be very strong. I was once told by a groom, that the dose I dispensed was not strong enough, for it had not purged the horse more than fourteen or fifteen times. In many cases these sapient gentlemen are not satisfied unless a horse have twenty or thirty evacuations. Super-purgation has destroyed hundreds of horses, and it has irreparably injured thousands. Extra purging debilitates the horse more than the human, probably from a lax state of bowels being more common in man, owing to the presence of both cystic and hepatic bile, as well as a dependent situation. It is hardly possible to conceive a more deplorable object than a horse under the action of an enormous purgative. The liquid aliments escaping almost involuntarily from a red protruded anus, excoriated with the violence and frequency of the dejections; the belly drawn to the flank, cold sweats bedewing the frame, appetite totally lost, and the strength so abject, as to leave the animal hardly the power of tottering from one stall to another; and yet to this state does the brutality and ignorance of an infinite number of grooms doom the horses of their owners to. The number and strength of the purgative doses are not the only evils also to which the horse is liable, from improper purgation; the articles used are likewise often of an injurious nature. Frequently with the coarsest aloes, the groom's prescription directs gamboge, which greatly increases its drastic qualities. Neither are these gentry, or indeed some practitioners, so attentive to previous preparation as they should be: a powerful dose of physic put into a horse from hard work and full keep, without previous mashing, hurries the hardened fæces forwards until it forms them into an impenetrable mass: inflammation ensues, and on the third day the horse is found dead, and swollen immensely. In hot weather, inflammation supervenes on physic, when at all too active; and dysentery is a very common consequence of summer purging. When good physic has been properly given, still it is often rendered injurious, and even destructive, by carelessness or ignorance. Cold water given at these times will injure; a sudden chill from a door left carelessly open may bring on enteritis; and immoderate exercise, to promote a "stirring up of the humours," has destroyed many a valuable animal.

Of the articles used in purging of horses.—A great discrepancy of opinion prevails on this head also, but, if the distinction between laxatives and purgatives be maintained, it would tend to reconcile these contentions. There are numerous articles which simply *relax* the bowels, i. e. slightly increase their peristaltic motion; but very few which produce active purgation. Of the former, bran, calomel, neutral salts, castor, linseed, and olive oils, are the most usual instances; but it must be confessed, that with the exception of bran all the others occasionally fail. Rhubarb, jalap, colocynth and elaterium, are inert, except in such doses as derange the bowels dangerously, and, therefore, it is evident how uselessly these enter into the formulæ of purges for horses. Some further account of these several substances will appear in the *Veterinary Materia Medica*, at the end of the work. Gamboge, which is also added to horse physic, is a still more dangerous addition, for it sometimes proves a most drastic purgative, and in others is totally inert.

The purgative of the horse, therefore, in almost every instance, is aloes. Lately, however, there has been added to the list of effective æquine purgatives the *croton tiglium*, of which anon. Much difference of opinion exists on the preference due to the various kinds of aloes; nor can we ever arrive at a just conclusion on this head, until we unite a conclave of *honest* druggists, both wholesale and retail, from whom alone might be procured something like a knowledge of the various sorts *unadulterated;* and until we are better informed of the original state of these articles, or until we can get them of real purity, our written accounts can be little depended on; for, if I be not mistaken, they are all mixed and remixed to suit the convenience of the dealer; and are named and re-named, to suit the wants of the purchaser; to which circumstance we are indebted for the contradictory accounts we read relative to them. Of the aloe varieties two are principally in use; the hepatic* or Barbadoes, and the cabaline* or Cape. The Barbadoes are somewhat quicker and stronger in their action, and consequently rather more drastic in their operation than the Cape, and therefore in some cases are not to be preferred. But as they are in general more certain in their action than the Cape, I have commonly made use of them. Cabaline or Cape aloes are used at the Veterinary College, which tells in their favour, and they are generally thought milder and weaker; it is usual, therefore, to consider, that a moderate dose of physic which requires six drams of Barbadoes, should have seven drams of Cape aloes.

* The names hepatic and cabaline, are frequently used to signify aloetic admixtures also of the various kinds, which may occasionally mislead in the dispensing or ordering of purges.

The quantity of aloes requisite to produce purging is dependent on so many circumstances, that it is no wonder if it should be so often mismanaged in ignorant hands; and this is one of the sources of the complexity and danger of physicking horses, except with those systematically accustomed to it. Horses vary greatly in their intrinsic capability of being acted on by purgatives. Mr. Coleman, in his lectures, mentions a horse of his own that would purge by taking three drams only of Cape aloes: while Mr. Percivall quotes a horse which belonged to Mr. O'Conner, veterinary surgeon, of Newmarket, which at three years old required fourteen drams of aloes to purge its bowels. Old horses generally require more than younger horses, and continued hard meat makes much difference in this respect; it requiring much more to purge such horses than others softer fed. These facts serve to shew the extreme necessity of prescribing a very moderate quantity only as the first dose for a horse, with whose constitutional peculiarities we are unacquainted. The requisite quantity is also greatly dependent on various other circumstances. Horses fresh from grass purge with a much less dose than horses long stabled; and to horses used to bran mashes as daily food, a moderate quantity only is requisite; while in other instances, by mashing three times a day for several days, we may make four or five drams do the work of eight. This shews the extreme importance of previous mashing, particularly in weakly horses, and also in such as have been previously accustomed to much hard food. Form also influences the quantity requisite; a thin, narrow chested, lank-sided horse, will purge more readily than a circular deep-carcassed one. It may be considered, therefore, that the quantities required to purge horses, both prudently and effectively, range between five drams and ten; the extent of which range will serve to shew that something more is requisite than a blind acquiescence in any acknowledged recipe or invariable form. Thus far as regards the account of aloes generally; we shall presently advert to them again particularly.

The croton tiglium is a purgative of new discovery, and one which there is reason to hope is not, like many others, confined to man, but extends its influence to our present subject also. At present, however, the acquaintance with it is very limited, even among those whose opportunities are the most extensive, and consequently we can hardly wonder, that, while one is praising it as an article of vast import to the veterinary world, another has found it deceive his expectations. Having for some time relinquished all veterinary practice, I do not affect to know any thing of it from experience; my evidence therefore can only be drawn from the accounts of others, the best of which is that given by Mr. Percivall, obtained, as he candidly acknowledges, from Mr. Field, junior, veterinary surgeon, who seems to have paid a most laudable attention to the subject. The capsule of the croton seed is, I believe, what has been principally tried, and has been found, if I be rightly informed, pretty generally unworthy of dependence on; as much perhaps owing to the tricks it is likely are already played with it, as to its own intrinsic want of energy. My friend Mr. Youatt has tried it with variable effect, but altogether he is not prepossessed in its favour. Several of his veterinary friends, I believe, have also tried it, without being able to come to a direct conclusion relative to it. Mr. Field has however found, that two drams of the capsule have produced the same effect with forty grains of the farina. The farina is the remains of the kernel of the croton seed, after it has had the croton oil expressed from it. This farina, when genuine, appears to possess more certainty of action. Mr. Field, indeed, appears to exhibit it with equal confidence in its certainty and safety as in aloes: he estimates that thirty grains of it are equivalent to six drams of Barbadoes aloes. The croton oil is probably equally certain in its action with the farina, but its extreme price amounts at present, at least, to a prohibition of its use, and indeed has prevented any data of quantity and quality being formed relative to it. Mr. Percivall suggests that from forty drops to a dram might be found the quantity necessary to fully purge; and he comes to the conclusion, that at a future time it may become a valuable addition to our veterinary list; but that as yet it presents no other apparent advantages over aloes but its diminished bulk, seeing it takes fully as much time to operate as aloes.—See *Croton Tihlium, Mat. Med.*

It appears therefore, that, at present, aloes will form the prevailing purgative; and we shall proceed by offering, for the convenience of guiding the amateur and junior practitioner, the formulæ of three several strengths formed of Barbadoes aloes, to each of which from one dram to one dram and a half may be added in case Cape aloes be preferred, which will equalize their action.

No. 1.—Barbadoes aloes*	....	five drams
Oil of caraways	....	ten drops
Castile soap	....	half an ounce.

Make into a ball with syrup, honey, or treacle.

No. 2.—Barbadoes aloes .... seven drams and half.

Add and mix, as the former.

No. 3.—Barbadoes aloes .... nine drams.

Add and mix, as the former.

When it is thought proper to give mercurial physic for worms, or skin affections, two drams of calomel may be given the night previous in a mash, first mixed with a table spoonful of flour. This, by lying all night in the horse, may, perhaps, assist its efficacy, particularly in case of worms; and the aloetic ball may be given the next morning; keeping in mind that it should be something less strong for the calomel already given.

Treatment connected with Physicking.—The intestines should always be prepared for this operation by bran mashes, and which should be given two or three days previously, nor indeed should the physic be ever administered until the stools present some appearance of softening. The first dose given to every horse, with which we are not well aquainted, should be a very mild one, for some horses are much more

* Practitioners differ much as to the propriety of admitting any mixture of matters in their purging doses. Relative to the incongruous jumble of the old recipes, there can be but one opinion; but, are Barbadoes aloes rendered more mild by the admixture of the supertartrate of potash, (cream of tartar) as Mr. Peall directs? or are carminatives a preventive to the griping quality of aloes in general? Mr. Bracy Clark strongly condemns all compositions with aloes; but as we know the horse bears spicy stimulants well (and he recommends them himself as stomachics), is it not reasonable to suppose them an useful addition to cathartics? A hurtful one, I believe, they cannot prove. On the subject of cream of tartar I have no experience, but I have much respect for Mr. Peall's opinion.

easily purged than others; and if the dose do not operate, it can do no harm, as it is often most erroneously supposed to do. Exercise is of particular importance in physicking; but I would earnestly caution the attendants against active trotting or galloping. Brisk and continued walking is all that ought to be allowed. The importance of exercise is by no means sufficiently considered; half the quantity of any cathartic, with plenty of walking exercise, will operate nearly as much as a double dose without; so that the degree of purging may be always regulated nearly to our wish, which is a very desirable circumstance. When physic does not work kindly, the exercise should be repeated at short intervals of two hours, till it does; and then it should be altogether omitted, as it would fatigue. Cold water should never be allowed, but, if the horse will not drink it warm, it may be given cool, but never cold. On this particular it is also necessary to observe, that ample dilution of the bowels is of the utmost consequence to insure physic working kindly. Entice the horse therefore to drink by every means, and by no means forget the necessary precaution of given him pure water, from a perfectly clean pail. When it is either smoaked or greasy, it cannot be expected that so nice an animal as a horse will drink. During the working of the physic, he should be kept warm, both by the stable and by clothing, and he must be exercised (if in winter) in clothes proportioned to the cold.

When a purge is to be given, proceed as follows:—The horse having fasted an hour or two in the morning, the ball is to be given him; after which he should be offered some warm water; or it will not be improper to let him have his ball a quarter of an hour after he has had about half his usual quantity of water; for it sometimes happens that the ball disgusts, and then he will not drink for some hours after, which is not so favourable to an early solution of the ball. After it is taken, he should be fasted another hour, or an hour and a half, when a small quantity of good hay may be allowed, or a bran mash may be given, with a very few oats sprinkled in it, to make it palatable: he should, at noon, be walked for half an hour or a hour, with hay or mash feeding afterwards, and exercised again half an hour in the evening, being allowed warm or chilled water at intervals during the day, with hay and a bran mash again towards night. Early on the following morning the physic will probably begin to work, which if it does briskly, no more exercise need be given: but if not, half an hour's walking should be allowed, when the horse may have a mash and warm water. After this, another half hour's exercise should be given (walking only), and which is to be repeated every other hour or two, till the physic work kindly, allowing mashes, and a little clean hay occasionally, and warm water as often as he will take it. Should the horse appear griped and uneasy, a warm clyster of the common kind may be given, which will generally relieve with exercise, but do not repeat the clyster; and in the event of its still continuing, which will seldom be the case when good aloes are used, then the following drink may be given, hand-rubbing the belly well at the same time. (See *Colic.*)

Sound ale	a pint
Peppermint water	a pint.

Mix, and give rather more than blood warm.

It occasionally happens, that notwithstanding every attention, physic will not work on the second day, in which case let nothing tempt the practitioner, as has been done, to give another dose immediately; for it sometimes happens that purgatives will not act until the third day. But when a case occurs of non-purgation, always wait until the third day, when, if no symptoms of purging appear, either let the horse rest altogether for two days longer, and then give him rather a stronger dose; or commence by giving him a quarter of the original dose every six hours till it purge, mashing, giving exercise, and warm water as before. Let it also be remembered, that it is erroneous to encourage liquid purging to twenty, thirty, or more dejections. No good attends this practice. I never wish any horse I physic, to have more than from twelve to fifteen liquid evacuations; all beyond this, weaken the intestines and injure the horse.

In the usual course of physic, on the next day after the operation of the purgative, the fæces will resume nearly their former consistency and shape, when the physic is said to be *set*. If it however continue to operate with nearly the same violence as on the day before, it must be regarded as a case of *super-purgation*, and recourse must be immediately had to the treatment already directed. (See page 432.) Otherwise, the horse may now return to his former habits, giving him corn at first rather sparingly, with moderate exercise; and, in five or six days from its setting, if the operation have been only ordinary, a *second* dose may be given, which is commonly required to be a *little* stronger than the first. After this, with the same caution, if it be deemed necessary a *third* dose may be given; which is usually considered a course of physic: but the number of doses ought, as before pointed out, never to be under the arbitrary direction of custom, but should be regulated by the existing circumstances.

FIRING.

This becomes an important and a very salutary agent in good hands. The practice of firing was not always confined to quadrupeds; on the contrary, it probably was first used on man; and to this day in many countries it is a very popular remedy among human surgeons. In India it is applied over the abdomen for the cure of the ague-cake, which is nothing more than a schirrosity of the liver; it is also still used by moxa for white swellings and numerous other complaints: nor would it be difficult to prove that we have no remedies in human surgery, except blisters and mercury, that can compensate for its disuse. Firing is performed on horses for two purposes: one for the forming of a permanent bandage to a part, which it does by destroying the elasticity of the skin, and lessening its surface; the other, that of raising an active inflammation, and thereby exciting absorption. Sometimes it is used to answer one of these purposes only; and sometimes it is performed to promote both conjointly. The Arabs fire the joints of their young colts to strengthen them, by the constant bandage the cicatrix forms to the part. Some English breeders of blood horses have done the same, but the practice is rare. This is an instance where firing is performed for the first purpose. In splints, spavins, and ringbones, firing is used as a strong stimulus to the surrounding absorbents, to remove any extraneous substance lately deposited; hence the osseous matter so hurtfully thrown out, which forms such swellings, becomes swallowed up by these vessels, and thus removed. These are instances where firing is used principally to promote external inflammation, thereby to relieve a more internal one. But even here, the future pressure occasioned by the cicatrix is an assistant, and often a principal one, to the removal of the adventitious deposit. To increase the original inflammation, or to keep it up, it is common in these cases to apply a blister over the firing. In enlargements left after violent strains, we fire the legs both to excite the absorbents to remove the deposit of coagulable lymph; and also, by straightening the skin, to act as a permanent bandage on the part for the future. The various cases in which firing is considered necessary, are dispersed through the body of the Work; and it would be unnecessary to enumerate them here. It need only be at present noticed, that as it is a painful operation, so it should never be resorted to but when absolutely necessary; and the more so, as it leaves a permanent blemish. As blisters act in a similar way, except that they leave no permanent bandage; so, when absorption only is required, repeated blistering will often supersede the necessity of firing; and as they can be applied as often as we wish, so, as a promoter of absorption merely, they are greatly to be preferred in many instances. On the subject of blistering immediately after firing, different opinions are entertained. A morbid sensibility, or rather an artful affectation of feeling, induces some to blame all which does not square with the popular outcry. My life has been devoted to the amelioration of the miseries of the whole brute race; and I am the last that would inflict one *useless* pang on them: but when, by a momentary addition to present suffering, I could abstract years of future pain, I would not court popularity by joining in decrying all painful operations. When it is of consequence to keep up the irritation in future, or even to increase it at the present, which we dare not do by deeper firing, or by lines too near each other, then blistering *immediately* after firing is admissible. Such cases occur in long continued enlargements, ligamentary or osseous; but when firing is applied to four *stale* extremities, or even to two, which present only the ordinary appearances of disease, it is not only unnecessary, but it is wantonly cruel, and, what perhaps will be more deterring, it is dangerous also, and has proved destructive.

The *Mode of Cauterization* differs according to circumstances. As a general rule it ought, of course, to be applied in the direction of the hair, by which mode blemish is lessened; but this rule cannot be arbitrarily followed, although it ought to do away with all the false pride of exhibiting critical figures by the cicatrices. The Veterinary College recommend that the limbs be *always* fired in perpendicular lines, the reasons for which are obvious. If it be applied as a bandage, in no direction can it corrugate the skin in so effective a manner as one inversely to the action as well as enlargements of the parts. When the principles of the action of the cautery are understood, all attention to forms of linear firing, beyond what are suggested by the *medical* consequences to be expected from it, are empirical.

Various shaped instruments for cauterization (*i. e. firing irons*) are necessary for the veterinarian. The principal are the *searing iron* for the tail; the *budding iron* for cavities; and the *demi lunette* or common iron, with numerous minor ones. All these are generally known. They should all be sufficiently thick to retain the heat, and should never be heated to a white, but to a red heat only: and in firing in lines, care should be taken that, by repeated heating, the firing iron does not form too sharp an edge, or the skin may be fired through. To prevent the possibility of this, after each heating, the edge should be rubbed moderately, to round it, and also to remove any loose scoriæ that may be attached. The best mode of heating the irons, of which there should always be three or four, is by means of a charcoal fire in a chafing-dish, placed not far from the operator. This will save much trouble, and greatly expedite the business. I must again caution the young practitioner to let no consideration induce him to fire through the cuticle: if the cutis or true skin be wounded, a very considerable inflammation and ulceration will follow. To prevent this, when the iron is very hot, pass it more quickly and lightly; but as it cools, draw it more leisurely and with a greater pressure. Old spavins and ringbones require the severest firing; but in these cases even, it should never be carried through the skin. I have sometimes fired a spavin with a sharpened budding iron, in which case I have perforated the skin purposely; but it has only been in very bad cases, as a desperate remedy, and it has always excited very considerable inflammation. Sometimes good effects have followed, and sometimes I have gained no more benefit than I should from the usual mode; and one or two I injured by these means. The proper depth of the line of fire may be easily known by the colour it produces, which is a yellowish brown, not unlike that of the coloured buckskin breeches lately worn. In all cases, the hair should be cut closely from all the parts that the fire is to pass over: without this precaution, the smoke will impede the sight, and the lines will not be easily drawn correctly. Some chalk each line first, and I would recommend this to the junior practitioner. When it is not deemed prudent to blister immediately after the firing is over, nothing more need be applied unless the weather be very hot, in which case a small quantity of tar may be rubbed on, and some loose tow wrapped over, which will keep the flies from annoying the part. In two or three days rub in daily some oil, or other greasy matter, to prevent a cracking of the skin. It has been very judiciously observed by Professor Peall, that we expect the benefit from firing to be immediate, but that it often does not shew itself for some weeks after. This is true; and the reason is, that the continued pressure occasioned by the cicatrix left, is a constant stimulant to the part underneath.

BLISTERING.

This is an operation of very great utility, and is, perhaps, compared with its benefits and importance, the safest that is performed. When a *vesicatory* becomes absorbed through the pores of the skin, it inflames the sensible cutis underneath; the consequence of which is a determination of serum to the part, which, in the human, elevates the cuticle into a bladder equal to the surface inflamed: but in the horse, from the greater tenacity of the cuticular connexions, it becomes separated in the form of small distinct vesicles only. If the irritating cause be quickly removed, the serum may be reabsorbed, and the surface restored by a slight effort of adhesive inflammation. If the irritant act in a still minor degree, it simply irritates the vessels of the cutis to an infiltration of fluid through the sensible pores, but produces no desquamation of cuticle. Such has been called, and not so erroneously as supposed, a *sweating blister.* But when by continued irritation, or by denuding the surface by rupturing the vessels, the cutis is exposed, suppuration succeeds, and the part is fully blistered.

The salutary action of blisters depends, first, on the stimulus they give to the absorbents, and, next, on the inflammation which they excite, proving a counter-irritant to some other part. As a stimulus to the absorbents, they act in the removal of injurious deposits, as the coagula arising from strains or ligamentary extensions; and we expect them to act beneficially also in the same way when we apply them to the exostoses of splints and spavins. But it is to be remarked, that when any existing deposit is of long continuance, or is osseous, it requires that the action of the vesicatory be kept up, either by repeated active blistering, or by a frequent renewal of a milder kind of the original blister, or by a daily application of the ointment of savine. (See *Mat. Med.*) Mercurial blisters have been thought to accelerate the absorption, and I once thought so myself; but it is very doubtful whether they at all assist active blistering. Alone they may assist, and therefore I would still recommend some days' previous application of mercurial friction over obstinate and bony swellings.

Blisters are very important aids in inflammatory affections, as counter-irritants. It appears to be a law in the animal economy, that two inflammations seldom exist in the vicinity of each other; therefore, when such an affection has taken place in any part, and we wish to remove it, we attempt to raise an artificial inflammation in the neighbourhood by means of blisters; which, if we effect, we remove, or at least lessen, the original one. Therefore, in inflammatory affections of the lungs, bowels, &c., it is proper to blister the chest, belly, &c. very extensively, by which means the vascular action may be removed from the vital organs to parts of less importance. The *vesicatory*, or *blister* for general use in veterinary medicine, as a simple stimulant, should for these cases be composed of Spanish flies only. (See *Blisters* in the *Materia Medica.*) Cheaper substitutes are used; but they irritate violently, and, in extensive inflammatory affections, they are on this account perfectly inadmissible.

The mode of blistering is sufficiently known; the hair should be cut or shorn as close as possible from around the part; the blistering matter should then be well rubbed in for ten or fifteen minutes; on which thorough application of it, much of its operation depends: having done this, smooth it down, and spread a little more on the surface with a spatula. If the pasterns and fetlocks are the parts to be blistered, previous to rubbing in the ointment, smear some lard, tallow, or melted suet, over the heels, and within the hollow at the back of the small pastern. This will often prevent grease or troublesome sores from forming, from the blistering ointment falling on these parts. Another caution is also necessary to be observed with regard to this operation, which is, that when a horse is much out of condition, particularly in the autumn or winter, and is blistered behind, the suppurative surface is very apt to degenerate into the diseased state of grease, and to produce much trouble. In such cases, therefore, if blistering cannot be avoided, much caution is required in the operation, as well as to *prepare* the animal for it. While a blister is acting, the litter should be removed from under the feet, or it will tickle the legs, and irritate: the horse should also have hay or other food constantly before him, which will draw off his attention and quiet the pain ; but, above all, his head ought to be most carefully secured, for two days and nights, to prevent him lying down, but more especially to prevent him biting the blistered part. Unless this be particularly attended to, the irritation will make him tear and disfigure himself much. On the third evening, he may be permitted to lie down ; but a prevention should even then be continued, by means of what is called a cradle, which should also be put on the moment the blister begins to be troublesome, as an assistant security. This apparatus may be bought ready at turning shops ; or may be made of eight or ten pieces of round wood, an inch and a half in diameter, and two feet long. These are strung at each end on a rope, and fastened around the neck, by which the horse is effectually prevented from bending his neck to bite or tear himself. When it is intended to blister repeatedly, the effects of the first should have completely subsided before it is renewed ; the scurf and scabs be first cleared away, and the part well washed with soap and water, which will clear it from any matter that might obstruct the action of the renewed blister. In all cases, the third or fourth day after a blister has been applied, the part should be well rubbed with some lard, palm oil, or other greasy matter, to prevent the skin cracking and chapping ; and when it is proposed to turn a horse out after, it should never be done until the whole blistered surface be quite healed, or dirt, flies, &c. may prove hurtful. It remains to add, that in blistering for bony swellings, as ringbones, splints, spavins, and also for ligamentary enlargements of long standing, called " callusses," I would recommend to rub the part well with mercurial ointment once or twice a day for a week or ten days before the blister is applied ; by which means the efficacy and action of the blister appear to be increased. Instead of repeated active blistering, it is in some cases preferable to keep up a continual slight irritation on the original blister, by means of stimulants, as turpentine, savine ointment, mild blistering ointment, &c. ; but caution is necessary to avoid forming an eschar, and thereby a permanent blemish: when a blemish is not of consequence, this plan will be found often more efficacious than firing, as in splints, spavins, &c. Some practitioners blister mildly one day, and on the next wash off the blistering matter, and thereby save the loss of hair. But there is more of appearance than of reality in this plan. If a blister be requisite, it requires all its activity ; if it can be dispensed with, and yet some stimulant be wanting, use the following, which will equally save the hair, and promote a longer action.

Sweating Blisters.—This term is made use of among farriers, to imply a moderately active stimulant, generally of a liquid kind, that will not excoriate, raise the cuticle, or cause a separation of hair ; and yet will rouse the absorbents, and occasion, as is supposed, a transpiration of fluid mater, or a *sweating* effect, whereby accumulations are removed in the latter stages of muscular and ligamentary strains, as those of the shoulder, hip, stifle, and some others; in which, it will be seen, I have sometimes recommended this plan. The mode I generally adopt to effect it, is this: I apply the liquid stimulant (see *Sweating Blisters* in *Mat. Med.*) of a strength adapted to the irritability of the skin, which varies much in different habits; rubbing in daily a sufficient quantity, so that on the third or fourth day, but not before, a considerable tumefaction or swelling shall appear. I then desist, and suffer the swelling to subside, when I frequently find that it takes with it all the enlargement previously existing, as well as the lameness; if not, I repeat it.

All lesser matters in operative farriery may be found distributed under their several names in the *Veterinary Materia Medica.*

When I had completed the anatomical detail of the present Work, I paused a little, to endeavour to impress on the student's mind the importance of the subject treated on. Having now brought this more interesting part to a close also, I may with propriety again attempt to arrest his attention, and to point out to him the still greater importance of this subject, as well as the absolute necessity there is to his future well doing, that he should make himself fully master of every part of it before he proceeds on his professional career. Any attention he pays to this during his novitiate, will be amply recompensed by the success that will attend his future endeavours. By having a well grounded knowledge of the *principles* of his profession, he will be enabled to form a judicious plan of treatment for each case; not tied by invariable precedent, or confined to any unbending set of practical rules; but, thus armed, he may successfully vary his curative agencies, as the cases may themselves vary, or as their exigencies may require. A practice thus founded, will enable its artist to meet extraordinary or adverse circumstances, without that anxiety, suspense, and indecision, which often bewilder the but half informed; or push into blind hazard and rashness, him who has totally neglected to store his mind with these *principles*. In possession of these I would, however, strongly caution him from entering into speculative opinions, or wild and visionary theories, which too often prove a trap to the ardent and youthful mind, by affording a delusive prospect of a short road to fame, wealth, and perfection. Let him apply all he has gained to practice and experiment; and let him remember that the wisdom derived from experience is the most ready path to improvement; and that, although occasionally a sudden gleam may irradiate the extraordinary mind, the bright halo more often dazzles than informs. The safest and the surest track is the observance and collating of facts, from which a storehouse of the most useful knowledge may be raised, built on an unyielding base, which fashion cannot overturn, nor new opinions bring into disrepute. Of these, that is of *professional* facts, I would recommend that he should carefully note all he may obtain, from the most varied sources: and that he may fully avail himself of the benefits resulting from his own experience, I would advise him to carefully note and set down in a *case book* the practice employed in every disease that comes before him; with its leading symptoms, progress, and termination. These notes may be afterwards revised, and arranged under their several heads and classes; by which he may at any time, and at one view, see what appears worthy of repetition, and what presents itself as a matter to avoid. Finally, by neglecting no opportunities for improvement, and by a steady undeviating course, founded on integrity towards his employers, and humanity towards the animals concerned, he will gain esteem, reputation, and emolument. The pleasing consciousness will also arise, that he has proved useful in his day and generation, and has tended to ennoble the art he professes.

PART THE FOURTH.

THE

Veterinary Materia Medica,

OR, AN

ALPHABETICAL AND DESCRIPTIVE LIST

OF THE

VARIOUS MEDICINAL ARTICLES

At present in Use in Veterinary Practice.

THE

VETERINARY MATERIA MEDICA,

&c.

THE veterinary art is even yet so much in its infancy, that the operations of a few medicinal agents only are at present familiar to us; and some time will probably elapse, before any thing like a complete and systematic *Materia Medica* can be offered, for the use of the veterinary student; and I am very far from considering that I at all approach this by the following sketch. It will serve, however, as a vade mecum to the junior practitioner, and will give the leading features of most of the medicaments used in veterinary practice. I have introduced into it few formulæ: I would have introduced none, but to save repetition in the body of the work, and for the convenience of both the junior practitioner and amateur. For such as do appear I can answer, by their effects in my own practice. It has been, throughout, my aim to teach the practice of the art on *principles*, and not on *receipts*, which are but the bolsters to ignorance and empiricism. Nevertheless, as before stated, as a guide to both the junior practitioner and the amateur, the introduction of a few which have stood the test of a long experience, may prove useful.

I would strongly recommend to the veterinarian setting out in life, to have a neat and well regulated dispensatory. Except that the matters need not be quite so numerous, it should be a fac simile of a well arranged apothecary's shop. The various articles should be enclosed in drawers, pots, or bottles, according to their forms or properties: each should be separate, and each should be distinctly marked. Above all, it behoves him, if he wish either to satisfy himself, or to do justice to the cases under his care, to be most particular as to the *quality* of the *simples* and *compounds* he uses. On this, too much stress cannot be laid; for it has been justly observed, "any thing is thought good enough for a horse," and hence no medicinal articles are so shamefully adulterated as those intended for his use. The prudent veterinarian will find it his interest to deal with a druggist of established reputation, and to order none but genuine drugs, and of the best quality. At the present day, I should hope I need not caution him against the wretched trash offered under the names of *horse powders* and *horse oils*. These articles can be sold at any price; for they are very generally adulterated by farriers' druggists, to suit the pocket, the credit, or the tastes of their customers, whose usual ignorance of chemistry and pharmacy makes the imposition the more easy. The only means to avoid such deception is to compound for himself; and to do it with the best drugs.

In the *formulæ*, and *doses*, the apothecaries weights and measures are always meant, a table of which is added as a guide. I would also recommend to those whose knowledge of pharmacy is limited, to procure a complete set of weights and measures of apothecaries use, marked and graduated in *English* characters. Such are now sold at scale-makers, and prevent the possibility of mistake.

I have in this edition described the articles under their proper chemical characters, adding also the pharmaceutical one of the London Pharmacopœia; but I have at the same time inserted all the old popular names also, with a reference to their proper nomenclature: by which means the most unlettered will be at no loss; and others may be gradually led to assimilate this with its parent art of human pharmacy.

A TABLE *of the* WEIGHTS *and* MEASURES *generally used in* PHARMACY.

WEIGHTS:

The Pound	contains	Twelve ounces
—— Ounce		Eight drams
—— Dram		Three scruples
—— Scruple		Twenty grains.
—— Grain		

MEASURE OF FLUIDS:

The Gallon	contains	Eight pints
—— Pint		Sixteen fluid ounces
—— Fluid ounce		Eight fluid drams
—— Fluid dram		Sixty minims or drops.

Absorbents.—The efficacy of this class of remedies is supposed to consist in their tendency to correct a diseased acidity in the stomach; but as this organ in the horse has but a small portion of secreting surface, so he is less liable to affections of this nature than many other animals. In horned cattle, complaints apparently originating from this source are more common; hence cows, calves, and sheep, are sometimes benefited by chalk; which is the most usual antacid in veterinary practice.

Acetated Liquor of Ammonia.—This has been long known by the popular term of Mindererus's spirit, and is made by pouring a quart of vinegar on an ounce of volatile salt of ammonia. It may be also made by taking any quantity of spirit of hartshorn, and adding vinegar to it till it tastes neither salt nor sour. I consider it as a very important medicine in horse practice; it gently invigorates, is diaphoretic, and sometimes it proves mildly diuretic. It principally shews its salutary effects on the commencement of the debile stage, or at the close of lingering febrile diseases, particularly of the epidemic catarrh; in which cases it may be combined with camphor, but more particularly with powdered camomile (see Camomile). In the more early stages of the epidemic catarrh, it may be united with nitre and oxymel. The dose is from four to six ounces. In strains and ligamentary lamenesses it forms a very useful external application also.

Acetate of Copper, or Verdigris.—Internally, this subacetate of copper has been given in daily doses of two to three drams, and sometimes with success; but it does not appear, from what I have seen of it, to merit the exclusion of more appreciated remedies. It has, however, some power as a tonic, and, in this point of view, may be properly administered. Externally, its benefits are more apparent, as it proves one of the best detergents and mild escharotics with which we are acquainted. Mixed with honey, it forms ægyptiacum, and is used in ulcers of the mouth, and likewise as a paste to other ulcerated parts. Mixed with tar, it becomes one of the best applications for thrushes, grease, and cracks.

ACIDS. In chemical language these are a class of salts; but, familiarly, they express whatever produces the sense of sour to the taste. They are gained from the animal, vegetable, and mineral kingdoms. Such as are in use in veterinary medicine, are described under their proper names throughout the *Materia Medica.*

ÆGYPTIACUMS are mixtures of the acetate of copper *(verdigris)* and honey, sometimes with vinegar, borax, alum, &c. The simple ægyptiacum is used for ulcers of the mouth, the others for grease, cracks, &c.

ÆRUGO.—See ACETATE OF COPPER.

ÆTHER.—The volatility as well as the expense will ever prevent the sulphuric æther from coming into general use in veterinary practice; but the more dilute preparation of it, called *spirit of sulphuric æther,* may be often used with great benefit in spasmodic colic, in addition to the other means. The *nitrous æther,* or sweet spirit of nitre, as it is called, is a more general remedy, and will probably become still more so as it is more known. As a febrifuge, it is at once cooling without lowering. (See NITRE.) A dram of sulphuric æther to eight ounces of rose water makes an excellent collyrium for the latter stages of ophthalmia.

ÆTHIOPS MINERAL.—See SULPHURET OF QUICKSILVER.

ALOES.—These form a very important article in the veterinarian's list of medicines, and therefore too much care cannot be taken to procure them genuine. Every practitioner, however, should purchase them in the gross, and have them reduced to powder under his own inspection, as the surest preventive against adulteration. Aloes are of three kinds; Socotrine, Barbadoes and Cape. Formerly the socotrine were recommended, and the other kinds condemned as unsafe: but the Barbadoes are now in most request, as being the most certain in their action; principally, I believe, because they are less adulterated. Socotrine aloes appear in colour compounded of red, brown, and yellow; are very brittle and fragrant to the smell. Barbadoes aloes are of a deeper tint, less brittle, less fragrant, and more intensely bitter. Cape aloes in appearance hold a middle place between the two, and indeed what are so called are in many instances compounded by druggists of the refuse of both, and to which perhaps may be attributed much of their uncertainty. The action of each kind as a *purgative* is detailed under the head *Purgatives.* As an alterative, a stomachic, or a vermifuge, aloes are sometimes given in doses of one dram to two daily; they are also used in similar doses as a nauseant in inflammations. As an external detergent and stimulant application, they are used in the compound tinctures of myrrh and of benjamin, called friars balsam. Aloes will not pulverise readily except in frosty weather, at which time a sufficient quantity should be done to last the year through; and as they are apt again to unite into a solid mass, so, as soon as powdered, they should be mixed with something. I have always used for this purpose half their weight of lard, or palm oil: mixed in this manner they keep well, and form a uniform mass of a proper consistence to make balls; which dissolves readily in the stomach, never hardens, and is, I think, less apt to gripe than any other form.

The great difficulty attending aloetic balls is the keeping them in a uniform state. They are apt to become too hard or too soft. Mr. Bracy Clark has invented a method by which he informs us these inconveniencies are obviated. He places one vessel within another, exactly as carpenters melt glue; having water in the outer vessel, and aloes with one fifth of their weight of treacle in the inner one, which is carefully covered with a lid. The apparatus being put on the fire, is suffered to remain, the aloes and treacle being now and then, but not too often, stirred to combine them, for an hour or more, or until perfectly melted. The inner vessel being now taken from the outer, the contents are expeditiously cast in paper moulds or tubes, of the usual diameter of a horse ball. When cold, Mr. C. finds these balls flexible, yet solid, and that they remain so. He gives an ounce to a saddle or carriage horse, and ten drams to a cart horse.

A watery solution of aloes should be kept by every veterinarian, and which will be found in many instances a very convenient form, as well as desirable, on account of its quicker action. It may be made by grossly powdering a pound of the mass, and infusing it in a warm place in one pint and a half of proof spirit for three or four days; after which add soft water two quarts, and bottle for use. When to be taken, shake the vessel containing it, and give sediment and all, in doses of two, three, or four ounces, as the case may require.

Alteratives are articles that are supposed to act medicinally on the body, in a slow and nearly imperceptible manner. The usual alteratives among farriers are nitre, antimony, sulphur, resin, and spices; but a better acquaintance with the art teaches us to add mercurials, mineral acids, foxglove, wood barks, aloes, with some of the gums, and gum resins. A change also in the food becomes in some instances a powerful alterative. *Nitrated potash* or *nitre*, in doses of two to six drams, increases the urinary discharge, and thus becomes an alterative, by gently decreasing the accumulation of fluids in swelled heels and other œdematous enlargements. *Antimony* is given in several forms. The sulpharet, or what was called crude antimony, has been long a common alterative. It is still given in doses of two to six drams, in skin affections, as hidebound, &c. Antimonial powder, and tartarized antimony, called emetic tartar, which are both prepared from this (see Antimony), are also alteratives of a diaphoretic quality, in doses of one to two drams. *Resin* is an active and useful diuretic alterative, in doses of two to three or four drams; but it simply empties the system, while nitre is a refrigerant also. The supertartrate of potash, called cream of tartar, is an excellent alterative, particularly in conjunction with mercurials and sulphur, in skin affections, as surfeits, &c. &c. *Spices* are often too freely used by ignorant persons to produce a fine coat; but in judicious hands they become useful alteratives, by their invigorating and tonic quality. The submuriate of mercury, or *calomel*, is useful in all herpetic affections, and as a vermifuge also, in doses of a scruple to a dram; but its effects must be watched, or salivation may unexpectedly come on. The oxymuriate of mercury, or *corrosive sublimate*, may likewise be given in similar cases, and in farcy, glanders, grease, &c., in doses of ten grains to a scruple, watching its effects even more attentively than the former, as, in addition to salivation, it may produce inflammation of the stomach. *Arsenic* is not only given with the same intents as the last article, but as a tonic its effects are also very considerable, particularly in cases of protracted debility from chronic diseases. It is also a useful anthelmintic. The dose is the same as of corrosive sublimate, and similar cautions are to be observed in its exhibition. Foxglove is likewise a useful alterative in watery accumulations, in doses of two scruples to a dram. Diuretics, diaphoretics, laxatives, stomachics, and tonics, may be all likewise considered as alteratives. *See these articles.*

ALUM (*Alumen*).—This compounded body of sulphuric acid and pure argil is in very general use in veterinary practice, both externally and internally. In doses of one or two drams, it is an useful astringent in diarrhœa, diabetes, and other fluxes. It also possesses some virtues as a stomachic. Externally it is used as a styptic to stop hæmorrhage, by sprinkling it on the bleeding orifice, when its coagulating properties plug up the mouth of the vessel. It is a useful escharotic to destroy fungus, and a valuable detergent for foul ulcers. It is also a useful stimulant in inflammations of the eye; and a whey made of it forms a good astringent clyster. When it is burnt, it is rather milder, but its properties are not otherwise materially altered.

AMMONIA (*Ammonia carbonas*).—The gazeous ammonia, fixed into a solid form by combination with carbonic acid, forms the volatile ammoniacal salt of the druggists. It has been said to be a good stimulant in the latter stages of fever; but I have never tried it alone: united with vinegar, it forms the liquor ammonia acetatis, or spirit of Mindererus, and becomes then, indeed, a most excellent febrifuge.—See this article.

AMMONIACUM.—This *gum* is sometimes given in old obstinate coughs, but I have no evidence to offer of its efficacy.

ANISE SEED.—The powder of these seeds was formerly much used by farriers, and the druggists who make *horse powders* find it a profitable article; for it is adulterated to one third only of the genuine powder. It may be very properly united with other warm aromatics when cordials are admissible. It is also thought to possess some pectoral properties, but they are very trifling. The essential oil is the most active preparation of it; which see.

ANODYNES.—These are medicines that quiet pain. In the human, they procure sleep also, but no article with which we are acquainted is capable of producing this effect on the horse; whose stomach having but little secreting surface, on which almost all anodynes first act by a sympathetic effect, so, in him, this class is not very numerous. Nevertheless, here also the grand anodyne of the human, which is *opium*, must be the sheet anchor of the veterinarian. Camphor and æther will likewise mitigate spasm (see ANTISPASMODICS and NARCOTICS); but in all painful affections, where relief is essential, opium in doses of one, two, or three drams, is chiefly to be depended on.

ANTHELMINTICS, or *Worm medicines*, are such substances as mechanically irritate them by their speculi, or such as dislodge them by removing the mucus of the bowels, as purgatives, or such as prove noxious to the worms themselves. Tin or pewter, or iron filed fine, but not levigated, two or three ounces. Common salt, six to eight ounces. Oil of turpentine, two to three ounces. Savin, one to two ounces. Cowhage, half a dram. Calomel, a scruple. Arsenic, ten grains. Aloes, till they purge. All these are thought to fulfil one or other of these indications. Worm medicines should be given fasting, every day, for a fortnight.—See WORMS, in the DISEASES.

ANTIMONY.—The Sulphuret or crude antimony (*Antimonii sulphuretum*) is now very generally levigated after it is powdered, which considerably improves it. It has long been used as an alterative in doses of six drams to ten. Antimonial powder (*antimonium oxydum*) is a preparation from the crude, similar in qualities to Dr. James's celebrated powder, and affords the veterinarian an excellent febrifuge in doses of one to two drams. *Antimonium tartarizatum*, or emetic tartar, is another agent in horse practice. (See *tartarized antimony.*) In inflammatory affections, but particularly in catarrhal and pneumonic ones, its virtues are considerable in doses of one dram to two or three. In larger doses, it sensibly lessens the pulse.

Murias antimonii, or *butter of antimony*, is a caustic liquid preparation well known.—See CAUSTICS.

ANTISEPTICS are remedies supposed to possess a power of resisting a putrefactive process in the body; but this disposition is questioned, and all medicines of this class are now considered as acting only by their stimulating qualities.—See TONICS and STIMULANTS.

ANTISPASMODICS.—The horse is not subject to many spasmodic affections, and the class of remedies that applies to the few he is troubled with is small. Opium stands first on the list. Camphor, æther, oil of turpentine, and asafœtida, have all of them likewise proved useful. Cold also, in an intense degree, is a powerful antispasmodic, for which reason we apply it in tetanus.

APERIENTS.—See LAXATIVES.

ARGENTI NITRAS.—See NITRATED SILVER.

ARSENIC, OXIDE (*Arsenicum oxydum*).—This powerful medicament has been but lately properly appreciated. It is now known to be an excellent tonic, in doses of ten grains to thirty daily, in a very fine powder. Much more has been given; but as it sometimes appears to remain in the constitution until fully saturated with it, when it commences its noxious effects suddenly and irreparably, so it is always prudent to exhibit it with great caution. Nor should it ever be given on an empty stomach. It has the power of staying the progress of glanders, and it ultimately cures farcy. It appears also to have some vermifuge properties; and there is reason to suppose that it may in time prove an antidote to some animal poisons. Externally, it assists other applications in the cure of mange.

ASAFŒTIDA.—This *gum* is a minor antispasmodic.

ASTRINGENTS.—These are supposed to act on the living fibres by producing increased contraction in them, in which point of view they form a very numerous and important class; but in a more limited sense, they are considered as substances that restrain immoderate fluxes, as of the intestines and kidnies. Those that act by constringing the divided ends of blood vessels are called styptics. Opium, chalk, alum, starch, and catechu, act favourably in restraining intestinal fluxes. Catechu, alum, and acetate of lead, operate as astringents on the urinary passages.

Balls.—There are some circumstances, in the preparation of this form of medicines, not in general sufficiently attended to by veterinarians. Substances that are volatile do not keep well in balls, and therefore should only be made when used. The same caution is also requisite with such as liquefy by the absorption of air. All hard substances entering into balls should be finely powdered, and the moist matter that is to form them into an adhesive mass, should be of a nature that will neither ferment nor become mouldy. Very dry and bulky powders are no way so conveniently formed into a mass, or keep so well, as by the addition of lard or palm oil. Such as are less bulky, and other matters, may be mixed with honey, syrup, or treacle, unless they are intended for keeping some months; in which case, if lard or palm oil be not used, well made conserve of roses forms the best medium. A mass of balls not intended for immediate use should be pressed down into a jar, and tied over with a bladder.

As the giving of a ball is a forcible operation, so, when it is requisite to exhibit medicines more than once a day, it is more prudent to give them in the form of drinks. A horse ball should not be so large as a pullet's egg, but rather longer; nor should it be too hard. Among the *Veterinary Instruments* may be seen a very ingenious one for giving balls, which may be used in every case, but is particularly applicable to colts, ponies, or horses with a small mouth. The common balling iron, used by persons not expert at *delivering* a ball as it is termed, should always be guarded with cloth, to prevent the bars of the mouth from being wounded. *The most convenient mode of "delivering a ball"* is, to back the horse in his stall, when the operator, raising himself on a stool (the bottom of the bucket is a very usual convenience, but it sometimes falls in, and alarms the horse), should gently draw the tongue a little out of the mouth, so as to prevent its rising to resist the passage of the hand; but it should not be laid hold of alone, or the struggles of the horse may injure it, but should be held firmly by the fingers of the left hand against the jaw. The ball, being previously oiled, must now be taken in the fingers of the right hand, lengthwise, when the hand, being squeezed into as small a space as possible, should be passed up the mouth close to the roof, by which injury from the teeth will be avoided: having placed the ball on the root of the tongue, the hand may be withdrawn, and the tongue liberated, when the ball will pass down. The head should, during the whole, be but moderately elevated: when it is held too high, there is some danger of choking the horse.

Balsams are a kind of resinous juice, united with some of the extractive matter of the various plants they are obtained from, in combination with an essential oil. All the balsams are occasionally in use in veterinary medicine, and were formerly in very high estimation, for their supposed salutary action in chronic diseases of the lungs. They were also considered as a sovereign vulnerary for abraded urinary passages. It is the modern doctrine to think their efficacy overrated, and which is probably in some respects true, particularly as regards their expectorant qualities: nevertheless they are far from being inert;

on the contrary, they appear to act favourably in some instances, as a warm terebinthinated stimulant. There are balsams of Canada; of copaiva; of Gilead; of Peru; and of Tolu. What is called balsam of sulphur, is merely a compounded preparation of sulphur in oil.

BARBADOES TAR.—See TAR.

BARK.—Several of the *barks* enter into the veterinarian's list of medicaments, and all act by an astringent property on the animal fibre. Peruvian bark, which stands foremost in reputation, is almost excluded from our reach by its cost; and as horses are little subject to intermittents, so we can more readily dispense with it, particularly as the tonic qualities can be gained from others less expensive. I have used the willow, the elm, and the oak barks, particularly in conjunction with camomile, in cases of debility after fever, with advantage. Cascarilla and angustura barks prove themselves also valuable stomachic tonics. The elm and oak barks, in decoction, form excellent astringent washes for herpetic complaints, chapped heels, grease, &c. &c.

BATHING is not a convenient remedy for horses, but is occasionally a useful one. Sea bathing has been found beneficial in farcy, mange, and hidebound. And the bathing with cold water, or rather the dashing with it, is now and then beneficial in tetanus. A warm bath has been likewise tried with advantage in these and other cases.

BASILICON (*Ceratum resinæ*).

BEANS, in a medical point of view, are sometimes used as a tonic, and the flour of them as a restringent.

BENZOIN.—See GUMS.

BLISTERS.—The *action* of blisters, and the cases in which they are properly applied, are detailed under the operations. The *substances* used for this purpose are various; the most important is the meloe cantharides, or Spanish fly, whose action is so certain and mild, that, as a simple vesicatory for internal inflammatory affections, every thing else is totally inadmissible. Euphorbium, which is the general substance introduced as a substitute for a portion of these flies, is sufficiently active; but it irritates, and therefore ought never to be employed in these cases. However, in common blistering for strains, &c., where the expense of cantharides is objected to, auxiliary vesicatories may be admitted.—See CANTHARIDES.

No. 1.—*An excellent Blister for general Use.*

Powdered cantharides	one pound
Venice turpentine	ditto
Resin	ditto
Palm oil, or lard	two pounds.

Melt the three latter articles slowly together, and, when not too hot, gradually mix the cantharides or flies.

No. 2.—*A strong cheap Blister, not proper in Fevers.*

Powdered euphorbium	three ounces
Oil of vitriol	two drams
Spanish flies	one pound
Palm oil, or lard	three pounds
Resin	three pounds
Oil of turpentine	eight ounces.

Melt the resin with the lard or palm oil, after which add the turpentine. Having previously mixed the oil of vitriol very gradually with an ounce of water, as gradually add these to the melted mass, which again set on a very slow fire for ten minutes more: afterwards remove the whole, and, when beginning to cool, add the powders previously mixed together.

No. 3.—*A Mercurial Blister for Splints, Spavins, and Ringbones, which may be used where dependence is placed on the action of Mercurials with Blisters.*

Of either of the former	four ounces
Corrosive sublimate, powdered finely	half a dram.

No. 4.—*Liquid Blister, strong.*—See Sweating Blister.

Spanish flies, in gross powder	half a pound
Oil of turpentine	two quarts
Olive oil	one quart.

Steep the flies in the turpentine three weeks; strain off, and add the olive oil.

No. 5.—*Liquid Blister, mild.*

Of the above	one pint
Olive oil	a pint and a half.

No. 6.—*A Mustard Blister or Poultice, to be applied in cases of emergency, when blistering ointment is not at hand.*

Mix half a pound of flour of mustard into a paste, and apply hot. It may in some cases be strengthened by the addition of two ounces of oil of turpentine.

Blue Vitriol (*Cupri sulphas*).—See Sulphate of Copper.

Bole Armenian, vulgarly called bole armenic, is an argillaceous earth impregnated with iron; and was formerly extolled for its astringent strengthening qualities, both externally and internally; but, although it has some claim to attention, it is seldom now used except in charges.

Borax.—See Sodæ.

Bran.—Independent of the use of this as an article of food, it may be here introduced as a medicine also, being mucilaginous and aperient. In the latter point of view, it is perhaps the most certain laxative with which we are acquainted, and at the same time the most mild also.—See Mashes.

Burgundy Pitch differs so little from resin in its qualities, as to need no particular comment.—See Resin.

Butter of Antimony (*Antimonium muriatum*).—See Caustics.

Calamine, prepared (*Lapis calaminaris*), is an ore of zinc, which, when reduced to a fine powder, may be very usefully sprinkled on excoriations, and on cracks of the heels, to dry them. It is, however, most frequently used in the form of the unguent called calamine cerate, and formerly Turner's cerate. It is an excellent desiccative application.

Calomel.—(See *Submuriate of Quicksilver*).—This is a very useful medicine in horse practice, but is liable to some uncertainty in its action; therefore, in cases in which its use is to be continued, it should only be given in doses of fifteen to twenty grains daily; and even then should be carefully watched; for the moment the gums look red, the mouth feels hot, and a tenderness is observed in chewing, it should be immediately discontinued. Calomel has not much effect as a vermifuge beyond its purgative properties; but it is an excellent alterative in skin affections, as hidebound, surfeits, &c. It has proved useful also in farcy, grease, and œdema. I have used it successfully likewise in constitutional ophthalmia, both externally and internally. It is often united with purges, but is not to be depended on alone as a purgative in cases where it is used, and, in such, I prefer to give it in a mash on the evening preceding the morning the purge is to be given. Two drams are a proper quantity in such cases, but it must not be forgotten to subtract something from the strength of the morning purge. During the use of calomel as an alterative, the horse should not be exposed to wet or cold. It remains to add, that, unless this article be purchased from a druggist of reputation, it is very apt to be adulterated.

Camomile.—If I do not very wrongly appreciate this vegetable, it unites in an admirable degree the qualities of a stomachic and febrifuge. In debility of the stomach and bowels it is a most excellent tonic, in doses of an ounce and a half once or twice a day, particularly in conjunction with carbonate of iron. In fevers, but more particularly in the debile stage of catarrh which succeeds the first inflammatory attack, and when the purulent discharge has appeared, it proves a most valuable assistant to the other medicines prescribed. In conjunction with Mindererus's spirit, it forms the best febrifuge for the secondary stages of fever in general with which we are acquainted.

Camphor is an Indian produce, chiefly extracted from the *laurus camphora*. It is a narcotic to the horse as well as to the human, but only in very considerable quantities. In moderate doses, as two drams, it proves antispasmodic, and therefore may be usefully employed in flatulent colic, in conjunction with other remedies. United with opium, it has acted beneficially in spasmodic constrictions of the neck of the bladder not dependent on inflammation. It has also been highly spoken of as a powerful remedy in locked jaw; but though I have fully tried it in these cases, I am not able to say much in its favour. It has on very respectable authority been warmly praised for its virtues in fever; and as it is certainly a stimulant in moderate repeated doses, so in the latter stages of febrile complaints, where the debility is considerable, it may be very properly given. But in the more early stages its beneficial action is questionable: nor are its powers sufficient as a permanent stimulant to be depended on at any time without other auxiliaries. Externally it proves a mild discutient, in indurations and rheumatic affections; and I have also experienced advantage from its use in collyriums for inflamed eyes.

Cantharides, or Spanish Flies.—These are, or ought to be, the principal stimulating ingredient in the making of blisters; and every veterinarian should purchase them whole and powder them himself, otherwise he will be very apt to buy them adulterated. Previous to being powdered they should be moderately dried, and then leisurely pounded, or rather ground into a powder, the operator guarding his face with a fine muslin handkerchief, so as not to receive the fine particles into his nose and throat, otherwise an unpleasant sense of soreness will arise. If they are very dry, and the powder flies much, add a few drops of sweet oil, which will prevent this.

CAPSICUM.—In Indian horse practice, an infusion of Cayenne pepper is often given as a cure of flatulent colic, and as a vermifuge also; it is likewise used externally as a stimulant. I have myself tried it in colic with some advantage, but not with sufficient benefit to prefer it to the more established means. As a stomachic, it is decidedly inferior to the other spices.

CARAWAYS.—Both the seeds and essential oil are used as warm stomachic cordials.—See CORDIALS.

CARBONATE OF AMMONIA is called salt of hartshorn; carbonated water of ammonia is the spirit of hartshorn of the shops. It is convenient in veterinary practice, from its peculiar property of uniting oil and water. Internally, it is an antispasmodic in doses of eight to ten drams. United with acetous acid, or vinegar, it forms an excellent diaphoretic febrifuge. (See MINDERERUS'S SPIRIT.) And in conjunction with equal parts of oil, it forms the *volatile liniment*, which is a warm discutient application, much used for sore throat and indurated tumours.

CARBONATE OF IRON.—See IRON.

CARROTS.—These become, under many circumstances, a medicine, as well as an article of diet. Even for the latter purpose they are not sufficiently known; for they fatten without heating, i. e. without promoting plethora; but, on the contrary, they keep the body cool by keeping it open, and greatly promote a healthy coat. As a *medicine* they often remove cough, cure incipient grease, are good in farcy, and beneficial in surfeits and mange; but in these latter cases they must be wholly substituted for corn. A *poultice* formed of the scraped root is an excellent application in cases of ichorous discharge from the heels. —See POULTICES.

CASTOR OIL (*Oleum ricini*).—See OILS.

CATHARTICS.—Whatever excites the intestines to a more early, a more frequent, and a more copious discharge of their contents, may be termed a *cathartic*, or purge. If this effect be intended to be produced in a slight degree only, the article effecting it is termed a *laxative;* which see. The principal cathartic in veterinary practice is aloes. Castor oil, calomel, and neutral salts, may be considered as laxatives. —See PHYSICKING, ALOES, &c.

CATECHU.—By universal suffrage this has long been called *japan earth;* although it is an extract from a species of Indian acacia. It is a very mild but tolerably certain astringent; and its effects are, I think, even more certain on brutes than on the human subject. It acts favourably in relaxations of the urinary passages, and also in alvine fluxes or diarrhœa; in which latter cases it should be united with chalk, in doses of an ounce.

CAUSTICS.—In the human materia medica, these are described as *escharotics;* but, as this is the most familiar term, and our art is not sufficiently advanced to adhere strictly to an academic form; so we shall, under the term *caustics*, consider such substances as erode or destroy the animal solids, and in general coagulate the fluids also. The caustic articles are numerous, but we shall notice only such as are particularly useful or popular. The *mineral acids* are active caustics. Sulphuric acid, or *oil of vitriol*, is sometimes mixed with blistering ointment and with other matters, to hasten their stimulating effect.

Nitrous acid *(aquafortis)* may be used in a similar way. Muriate of antimony, very commonly called by farriers the *butter of antimony*, is an escharotic or caustic in very general use in veterinary practice. Applied to a raw surface, it instantly changes it white, destroying a thin layer of substance; hence it is a very convenient application in cankered feet, as, by means of a small camel's hair brush, it can be spread over as much or as little a portion of parts as is necessary. In sandcrack, when the sensible substance protrudes, it may be applied in a similar way. For the cure of corns, after the bruised portion has been removed, it likewise proves particularly useful. In obstinate cases of grease, the buds are sometimes beneficially touched with it: but in quittor, pole evil, and other sinuses, it is not so proper as some other escharotics.

Nitrated Silver *(Lunar caustic,* or *argenti nitras.)*—This is a preparation from silver, which renders it expensive: it is, however, essentially necessary to the veterinarian's dispensary, from its being so completely under command in its action, not extending its effects beyond the immediate part it is applied to. It proves the most convenient caustic for destroying the edges of a contaminated wound, when not too extensive, as the bite of a rabid animal. Dissolved in five, six, or eight times its own weight of water, it forms an excellent liquid caustic, peculiarly useful as a dressing for the foot rot in sheep, and also to touch the protruded portions in sandcrack. Dissolved in twenty times its weight of water, it makes a useful detergent wash for foul ulcers, and to keep down too luxuriant surfaces.—Caustic potash *(potassa fusa)*, called *lapis infernalis*, formed into a solid body, is also another powerful caustic, quicker in its action than the lunar, and therefore more convenient for extensive action; but its ready liquefaction renders it unfit for tedious operations or deep seated parts. Made into a paste with soap, it forms a useful escharotic to insert into the pipes of a quittor.—Oxymuriate of mercury *(hydrargyri oxymurias)*, known by the term *corrosive sublimate*, is a very usual caustic employed, and is, perhaps, one of the best for "*coring out*" of quittors; it also enters into the formation of very active blisters. In strong solution it is an excellent application for grease, often curing when every other means have failed.—The nitrous oxyde of quicksilver, called *red precipitate*, is also another preparation from mercury, and in very general use as an escharotic in horse practice. Sprinkled over very foul surfaces, it changes them quickly into a better state; and it acts equally beneficially on luxuriant sores, by destroying fungus, for which purpose its form of a powder renders it very convenient.—The Sulphate of copper, called *blue vitriol*, is a much milder escharotic than some others, and much used to destroy fungus, both in powder and solution. A milder solution, of a dram to six ounces of water, makes a detergent lotion for ulcers, as grease, &c.—*Quick lime* is sometimes used as an escharotic substance, for sprinkling over ulcerated surfaces, as cankered feet, &c.; for which purpose it is convenient, from its property of absorbing the moisture.

Cerates are ointments of a drying healing nature; the principal of which is calamine, or Turner's cerate.

Chalk.—This is a carbonate of lime, commonly used in a prepared state under the name of *prepared chalk*. It is an excellent antacid and astringent, in diarrhœa, dependent on a vitiated state of the stomachic, biliary, and intestinal secretions: in this way it is that it proves so beneficial in the scouring of calves. The dose is from half an ounce to two ounces. It is occasionally sprinkled over cracks also.

Charcoal has a peculiar property of amending the ichorous discharge from ill-conditioned ulcers, either sprinkled over them in powder, or mixed with a poultice.

Charges are not much used by modern veterinarians; for a more extensive acquaintance with the animal economy teaches us that there is but little activity in what are considered as external bracers. Nevertheless, I think there are some other points of view in which we may place this matter, to prove that *charges* may yet prove of much service in some cases, if it be merely to act as a bandage, or to protect from cold. In this way a *charge* becomes a useful application to the loins in rheumatism; not only as it protects the affected part from cold, but also from the resin in it proving a useful stimulant. Windgalls, old lamenessess from ligamentary extension, &c., may be still further assisted after firing or blistering, by the continued bandage kept up by a *charge*. Any strong adhesive, as resin, pitch, &c., melted with wax or oil sufficient to keep it from being too brittle, may be formed into a *charge*, and applied warm on the part; and as it cools, it should be covered with flocks or short tow. The strengthening part of a charge was supposed to consist in adding armenian bole, crocus metallorum, litharge, or other matters; which may be still done if thought proper.

Clysters.—These often form very important medicaments in veterinary practice, and have the valuable properties of being always safe, and commonly easy to give. From the length of time it requires to open the bowels by purgatives given by the mouth, clysters are often our principal dependance; and also when aperients cannot be given by the mouth, they become our only resource. Nutriment may likewise be given this way, when circumstances prevent its being received in the usual manner, or when it is requisite to throw a large quantity into the system. When clysters are given to remove costiveness, it is always proper to back-rake first (see Raking), as it removes any hardened dung that might obstruct the passage of the liquid. The apparatus made use of in giving a clyster should be a large hog's or ox's bladder, capable of holding five or six quarts, attached to a smooth wooden pipe an inch in diameter, and fourteen or sixteen inches long. The liquor should not be too warm; but the pipe being oiled, the whole must be conducted gently, so that the horse may not be surprised with its being thrown up too suddenly. This is a better instrument for giving an injection, than the pewter syringe made for this purpose by the veterinary instrument makers.

A laxative Clyster.

No. 1.—Thin gruel, or broth .... five quarts
Epsom or common salt............ six ounces.

A Clyster for Gripes.

No. 2.—Mash two moderate sized onions, over which pour oil of turpentine two ounces.
Thin gruel .... four quarts.

A nourishing Clyster.

No 3.—Thick gruel	....	three quarts
Strong ale	....	one quart.

Mix.—Or,

Strong broth	....	two quarts
Thickened milk	....	two quarts.

Mix.

Astringent Clysters.

No. 4.—Tripe liquor, or suet boiled in milk,		three pints
Thin starch	. . . .	two pints
Laudanum	. . . .	half an ounce.

No. 5.—Alum whey	. . . .	one quart
Boiled starch	. . . .	one quart.

Collyriums are washes, commonly in use for the eyes.—See Washes.

Conserves.—These are numerous in the human pharmacy, though but few are used in horse practice. The conserve of red roses is, however, a most convenient medium for forming balls, as it is adhesive, and, when properly made, keeps well.

Cordials.—These, with stomachics and tonics, might perhaps all of them be properly defined under one comprehensive term of *stimulants;* for on this property their utility principally depends. The mode of action of all of them in general cases appears to be by a sympathetic effect they excite between the stomach and the system; but as this organ in the horse is not so sympathetic as that of some animals, so their activity here is less apparent: nevertheless, warm spicy matters do certainly possess some efficacy; but, as might be supposed, such cordials appear to act best, and most permanently, as are received into the system at large, as generous food, malt, gruel, ale, &c. After this, it may be gathered that much dependence is not to be placed on what are termed cordials. In compliance, however, with the general prejudice, I have added three formulæ, as good, perhaps, as any.

No. 1.—Gentian, powdered	....	eight ounces
Ginger, ditto	....	four ounces
Coriander seeds, in powder	....	eight ounces
Caraway ditto, ditto	....	ditto
Oil of anise seed	....	half an ounce.

Make into a mass with lard, honey, treacle, or conserve of roses, and give one ounce and a half for a dose.

No. 2.—Of the above mass	....	one ounce
Gum myrrh	....	one dram
Balsam of Tolu	....	ditto.

No. 3.—Of the first mass	....	ten drams
Camphor	....	one dram
Opium	....	twenty grains.

Either of these may be given as a drink also, by infusing the powders in a pint of ale.

Coriander.—The seeds of the coriander are a warm aromatic stimulant.

Corrosive Sublimate.—See Oxymuriate of Quicksilver.

Cowhage.—This has been described as a valuable vermifuge in doses of half a dram to a dram; but it does not appear to me to possess much medicinal activity.

CREAM OF TARTAR (*Potassæ supertartras*).—See SUPERTARTRATE of POTASH.

CROTON TIGLIUM.—In India this has long been used both as a human and brute purgative, and lately it has entered into the veterinary practice of this country. In England the seeds only have been introduced. These are about the size of a tick bean, oval shaped, and of a dark brown colour, and consist of a capsule and a kernel. The *capsule* has been pretty generally tried, but without establishing any character for certainty of action. According to Mr. Field's report, two drams may be estimated as equal, in purgative action, to eight drams of Barbadoes aloes.

The seed itself produces, by expression, the celebrated novel human purgative, *croton oil,* but which is much too dear for veterinary purposes. The remainder of the seed having lost about a fifth of its weight by the expression of the oil, presents, when powdered, a brown *farinaceous powder,* which appears to possess all the purgative qualities of the oil, and has been given with much safety and certainty to horses. In estimating the proper dose of this farina, reference has been had to the effects of aloes also; and it has been found that five grains are equal to sixty of Barbadoes aloes. It is equally drastic, indeed somewhat more so than aloes, and it takes to the full as much time to produce purgation. At present, therefore, it appears to possess no other advantages over aloes, than its diminished bulk.

CROCUS METALLORUM.—The older farriers gave this in farcy, but it has now given place to more active agents.

CUPRI SULPHAS.—See SULPHATE of COPPER.

DECOCTIONS.—Many herbs are boiled to make decoctions of them. During the boiling, the vessel should be covered; and if the liquor be not intended for immediate use, it should afterwards be bottled, and have a small portion of some spirit added to it.

DEMULCENTS are medicines that act mechanically, by surrounding acrid matter, and thus sheathing it from hurting sensible and irritable parts. In this way, oily preparations act; likewise honey, gums, mucilages, &c. Diluents, as warm fluids, mashes, &c., are also demulcents, because they dilute acrimonious matter, and hence render it less active.

DIAPENTE was an old cordial, composed of gentian, bay berries, bithwort, ivory shavings, and myrrh. When made genuine, there are few better compounds as a stomachic cordial among those in present use.

DIAPHORETICS are supposed moderately to increase the natural exhalations of the skin. Sudorifics are intended to do it more actively, and to occasion actual sweating, which, in the horse, it proves very difficult to do; but a diaphoretic effect is more easy to excite. Vinegar will however often produce a violent perspiration, but it is not a salutary one; yet the same liquid, neutralized by ammoniacal salts into Mindererus's spirit, will often excite a favourable but mild diaphoretic effect. Antimonials in repeated doses, assisted by diluting liquors and warm cloathing, will likewise commonly produce some diaphoresis. Camphor, in considerable doses, will also uniformly occasion determination to the skin. The principal diaphoretic is gained from such medicines as nauseate. See this subject, p.385; see also *Veratrum Album.*

Digestives are stimulant applications that produce or increase the tendency to suppuration. They are mostly of the warm terebinthinated kind, or the gum resins. Of the former, are turpentine, resin, pitch, and tar: of the latter, are myrrh, aloes, balsams, &c.

Digitalis.—Foxglove is said to be another of the articles which are inert in veterinary practice, except in very large doses, and even then they are not always active. But it is one thing to act on the sensorium through the medium of the stomach, and another to act from being received into the circulation. In moderate *repeated* doses, the digitalis will lessen arterial action, and excite mild diaphoresis. It is, however, irregular in its action, and appears to act best when the constitution is already excited. In some cases it commences its operations by increasing the pulse; but it usually ends, when sufficiently continued (in doses of a dram to a dram and a half, every four hours), in lessening arterial action materially, particularly in pneumonia.

Discutients are remedies which dissolve impacted matter, as old swellings.—See Embrocations.

Diuretics.—As we have but little power over the skin of the horse, so we have correspondently a greater one over the kidnies. In the human, the very reverse of this is the case, and the articles that do act on the human kidney appear to do it principally by a sympathetic effort of the stomach; whereas, diuretics in the horse, at least the greater number of them, appear to act primarily on the kidnies by determining a greater quantity of blood to them, and by stimulating them to separate a larger quantity of water from it. The blood, therefore, losing an unusual proportion of its serum, or watery part, must be supplied from other sources: this is done by the absorbing vessels, which take up, in that case, any superfluous fluids they meet with, to supply the deficiency; therefore, in swelled legs, in cracks, in grease, or in any preternatural enlargements occasioned by fluids, we give diuretics with great advantage.

The principal diuretic substances in general use for the horse are, resin, nitre, turpentine, potash, and corrosive sublimate. The milder ones are digitalis, tobacco, squills, cream of tartar, neutral salts, juniper, &c. Many other substances act on the kidnies of the horse, but in a less degree. *Resin* is, perhaps, the most active diuretic in veterinary practice, and, in a dose of three to six or eight drams, is very certain in its operation. *Nitre*, in similar doses, is equally certain, but a little less active. In inflammatory diseases, and in urinary obstructions from gravel, it is also much to be preferred to resin. *Turpentine*, both liquid and solid, in doses of one ounce to three, are pretty certain diuretics; as also is *potash*, one or two ounces being diluted in two or three quarts of water, and given fasting. *Corrosive sublimate* proves a powerful diuretic, in doses of half a dram to a dram; but it is evident no such quantity should be given for this purpose, without first ascertaining that a lesser dose can be borne with impunity. I am disposed to think that the diuretic effect here produced is through the medium of the stomach alone, and not by its primary action on the kidnies; although mercury in all its forms increases the action of other diuretics, in the horse as well as in the human. As a mild diuretic, the *foxglove* is a good one, in doses of one dram to two, but it requires to be repeated at daily intervals to become certain in its effects. In similar doses, *tobacco* proves a diuretic, but it is less certain even than the digitalis; *squills* are the same. *Cream of tartar*, to prove certain in its action, must be given in doses of four to six ounces. All the *neutral salts*, in similar doses, act in the same way; but not always with uniform certainty. When they prove aperient, the flow of urine is in general inconsiderable, but it lasts some time.

When strong diuretics are used, it should not be forgotten that they act by over-exerting an important organ; so a frequent repetition of them may prove very injurious, and can only be warranted by some very urgent circumstance, as ascites. The unobservant are but little aware how very seriously too powerful and too often repeated diuretics injure the horse; for extreme debility and emaciation very usually follow when given in these extremes. Whenever a diuretic is given, the same cautions should be observed as with a purgative: to keep warm; to avoid over exertion; but, above all, to allow a large quantity of chilled water, which greatly increases the effect, and renders the action less hurtful: indeed, a large quantity of water will of itself prove a diuretic, particularly if the horse have previously fasted from it. Diuretics are given in the form of balls or powders; a formula of each of which is added:—

Diuretic Balls.

Resin, yellow	four pounds,
Nitre, in powder	two pounds,
Horse turpentine	two pounds,
Yellow soap	one pound.

Melt the resin, soap, and turpentine, over a slow fire; and when cooling add the nitre. Strong dose, one ounce and a half to two ounces. Mild dose, six drams to eight. The former may be given once a week; the latter every third or fourth day.

Diuretic Powders.

Yellow resin, powdered	two pounds,
Nitre, ditto	four pounds,
Cream of tartar, ditto	two pounds.

Dose, six drams to ten or twelve, twice a week, in a mash.

Drenches, or Drinks, are the *liquid* remedies given to brutes. It is not so safe to give them by means of a bottle, as by a horn, as instances have occurred of the neck of the bottle breaking. The head being elevated exactly in the same manner as in giving a ball, and the tongue also held; the drenching horn should be introduced to the hinder part of the mouth, and the contents poured over the root of the tongue; when, still keeping the head moderately elevated, but letting the tongue loose, the drink will be swallowed. Mr. Bracy Clark recommends to reverse the drinking horn, closing up the large end, and forming a moderate opening at the smaller end, to introduce that into the mouth. In tetanus such a horn would be useful; and at all times it prevents the waste of the liquid.

Electricity is seldom used in veterinary practice with us. On the Continent, powerful machines are found at the Veterinary Colleges of Paris and Berlin, for the treatment of cataract, gutta serena, paralysis, &c.

Embrocations are external remedies applied by rubbing them on the part with the hand, a sponge, flannel, or brush, as occasion suits. The formulæ for them are very numerous, and it would extend beyond our limits to particularize them here; but, in the course of the Work, frequent mention has been made of a *Saline Embrocation*, the recipe for which is as follows:—

Bay salt, bruised - - - - - - - - - - - - -	one pound,
Muriate of ammoniæ (*crude sal ammoniac*), ditto -	four ounces,
Acetate of lead (*sugar of lead*) - - - - - - -	one ounce,
Vinegar - - - - - - - - - - - - - - - - -	three pints,
Water - - - - - - - - - - - - - - - - -	one pint.

Mix.

Emetic Tartar (*Antimonii tartarisatum*).—See Tartarised Antimony.

Emollients, are remedies that soften and soothe irritation.—See Demulcents and Anodynes.

Epsom Salts (*Magnesiæ sulphas*).—See Sulphate of Magnesia. Glauber's salt possesses nearly similar properties, but is hardly so active, and much less convenient.

Escharotics are known among farriers by the more familiar term of caustics; which see.

Euphorbium.—This most acrid substance is sometimes used as a substitute for cantharides. In blisters for general purposes, where the expense is an object, a portion of it may be admissible; but it irritates extremely, and therefore should never be used in fevers; and I would even in all other cases advise the veterinarian rather to save in any other way than out of the feelings of the animal, whose welfare he is set as a guard over.—See Blisters.

Expectorants.—These are remedies that promote the removal of the irritating mucus formed in the bronchia and trachea, in affections of these parts. The principal of these are tartar emetic, foxglove, Mindererus's spirit, oxymel, and squills, and likewise nauseants.

Extract Saturn.—See Lead Preparations.

Ferri Carbonas.—See Iron.

Fomentations are warm fluid applications to an injured part, generally by means of cloths wrung out of the hot liquor, and re-applied as it cools. Infusions of various herbs have been employed for fomentations; but as the good effect is principally dependent on the warmth and moisture, so warm water alone is generally sufficient.

Fomentations allay irritation, and are useful as stimulants to the flagging powers in gangrene. By tending to unload the vessels, they also promote resolution in active inflammations; but they are seldom applied sufficiently long, and attendants are very apt, when they are removed, to leave the part wet and uncovered, by which more harm is done frequently than good, as the evaporation thus occasioned is a source of cold. As soon as an embrocation is removed, immediately wipe the part perfectly dry, and cover it up from the external air. I have in some cases fomented, and immediately applied a poultice. I believe the practice is singular, but it is more than ordinarily beneficial.

Gamboge.—This gum often proves a drastic purgative to the horse; but the same irregularity marks its effects here as in the human, and therefore it should not be substituted for better appreciated articles.

GARLIC was formerly much used in chronic coughs by the older farriers; but it is greatly inferior to squills, and therefore now seldom used.

GENTIAN is a useful stomachic bitter, and was much used in diapente; but it has now given place to articles more highly estimated, or perhaps more in fashion.

GINGER is perhaps the best spice in the veterinary materia medica; but even this should be sparingly used. As a warm cordial, it may be occasionally given in doses of two to three drams; and in flatulent colic, in doses of four to six drams.

GLAUBER'S SALT (*Sodæ sulphas*).—See EPSOM SALT.

GLYSTERS.—See CLYSTERS.

GOOSEGRASS, or CLIVERS.—I have heard it asserted that this is an excellent remedy for obstinate grease; but I have had no opportunity for trying it myself. A pint of the expressed juice is to be given twice a day, and a poultice of the bruised herb applied to the heels every night.

GOULARD'S EXTRACT, } See LEAD, and PREPARATIONS of.
GOULARD'S WASH. }

GRAINS OF PARADISE are a warm spicy seed, much in use among farriers, particularly for horned cattle; and are given by grooms to promote a fine coat. In this way they often do mischief; but as an addition to other stomachics, when necessary, they may be still properly made use of.

GRUEL is an article of no small consequence in the veterinary materia medica, inasmuch as it is bland, mild, and diluting. In making it, care should be had to its intention. If as a cordial or for nutriment, it ought to be thick; if as a diluent, it cannot be too thin. It should likewise, when made, be perfectly clean, and free from smoke. Ignorant servants are apt to think any thing sufficiently clean for a brute, without being aware that the most delicate female is not half so susceptible to unpleasant sensations from dirt, as is the horse. If this animal once has gruel offered to him that has been smoked, it is only by force that he will ever after take any. A useful diluent is also made from bran, by pouring boiling water on it, when it is called *bran tea*. It should be strained when cold.

GUM.—This is a juice that flows from various trees and plants, and inspissates by heat. The gums in use in human pharmacy are numerous; but they are fewer in veterinary practice. *Gum arabic* and *Gum tragacanth* are both sometimes used in pectoral drinks, and other demulcent medicaments.

GUM RESINS are compounded of gum and resin. *Gum ammoniacum* is sometimes used in chronic cough, but with doubtful advantage. *Gum guaiacum* is now very seldom used; *Gum dragon* has shared the same fate. *Gum myrrh:* This has outlived the reputation of the others; but it is questionable whether its virtue as a cordial, in the usual acceptation or meaning of the word, is not ideal; but as a permanent tonic it ranks higher.—See TONICS.

HARTSHORN, SPIRIT of (*Aqua carbonatis ammoniæ*). See CARBONATE of AMMONIA.—Carbonated water, or spirit of ammonia, is convenient in veterinary practice, from its peculiar property of uniting oil and water. Internally, it is an antispasmodic in doses of eight to ten drams. United with acetous acid, or vinegar, it forms an excellent diaphoretic febrifuge. (See MINDERERUS's SPIRIT.) And in conjunction with equal parts of oil, it forms the *volatile liniment*, which is a warm discutient application, much used for sore throat and indurated tumours.

HELLEBORE, WHITE.—See VERATRUM ALBUM.

HONEY is an article of importance in the veterinary pharmacopœia, not only as it is a usual medium for making balls with, as well as ægyptiacums; but also as it forms, in conjunction with vinegar, the simple oxymel, an article that should always be at hand, and which should never be made with sugar for cheapness; as there is little doubt but that the honey is in itself a demulcent and balsam of much virtue. And provided the veterinarian orders from his druggist the foreign honey, and watches his time for purchasing it, it may be obtained for 6*d.* 7*d.* or 8*d.* per pound. But this kind will be found too thin to form balls with; and, indeed, honey is so apt to ferment, that it should never be used in this way, but when the mass is intended for immediate use.

INSTRUMENTS.—Veterinarians are not sufficiently careful relative to their instruments, which should be kept in the best order, and always ready for immediate use. The lancets, fleams, &c. purchased at cutlers, are too apt to be procured wholesale from Sheffield or Birmingham, where the tempering is not sufficiently attended to. But the veterinarian who is curious in this respect, will do well to furnish himself from Mr. Long, of Holborn, London; who is, I believe, the only professed veterinary instrument maker in England. Here may be seen all the improvements that have taken place either from the suggestions of the various practitioners in this art, or from the ingenuity of Mr. L. himself; whose attention to this useful branch of the arts is acknowledged. For the use of veterinarians, I have added Mr. Long's List of Veterinary Instruments manufactured immediately by himself.

INFUSIONS are different from decoctions only, by the articles being *steeped* together instead of boiled.

IPECACUHANA.—This valuable article, in human practice, seems inert in the horse. I have given it in various doses, and under various circumstances, without having witnessed any effect from it.

IRON.—Almost all the preparations from this metal prove excellent tonics to the horse. Iron filings (*limatura ferri*) may be given in the corn or a mash, in doses of two or three ounces once or twice a day. The rust, or carbonate (*ferri carbonas*), is another form, and proves useful when given as the former, in doses of one ounce to two. Green vitriol, or copperas as it is called (*ferri sulphas*), is also given as a tonic, and some think it a preferable preparation, on account of its saline admixture. It is usually given in a daily dose of four to six drams. All the preparations of iron appear to produce most effect when combined with aromatic bitters.

JALAP, though so strong a human purgative, is totally inactive in the horse.

JAMES'S POWDER.—See ANTIMONY.

Japan Earth.—This erroneous term has been long applied to an inspissated juice now called *catechu ;* which see.

Juniper.—The berries are now and then given, but more frequently the essential oil is used as a warm stomachic and slight diuretic.

Kali.— See Potash.

Lard.—Many practitioners are at a loss for a substitute for lard, which forms the basis of most of their unctuous matters. When, however, lard cannot be procured, or is extravagantly dear, the fatty matter called *palm oil,* which is of the same consistence, may be always obtained; commonly at less than a shilling a pound.

Laudanum.—The liquid preparation or tincture of opium.—See Opium.

Laxatives may be denominated a milder purgative, but acting with less irritation, and hence much to be preferred in violent inflammatory affections. In some chronic cases, also, they are eligible, because they can be more frequently repeated. Of this latter kind are calomel with small doses of aloes. The laxatives proper in febrile cases are Epsom, Glauber's, or, in default of these, common salt, eight to twelve ounces, dissolved in thin gruel, and repeated every six or eight hours till it operates. In some cases, as bowel affections, from six to eight or ten ounces of castor or linseed oil, with a few ounces of watery tincture of aloes, form the best laxative. It must, however, be allowed, that most of these articles are uncertain in their action; but their uncertainty is by no means equal to that which it is the fashion of the present day to represent, as the experiments detailed, in which there is much discrepancy, shew. The action of laxatives is much assisted by diluting drinks, bran mashes, raking and clysters. Indeed, both bran mashes, and clysters, are of themselves in many cases sufficiently laxative. Grass, particularly that of the salt mashes, forms also an excellent laxative.

Lead.—Several preparations of this metal enter into veterinary practice. The principal of these is the

Lead, Acetate of (Superacetas plumbi).—In the former dispensatory, this was called the acetate of lead; but it is still familiarly known by the old term of *sugar of lead* among farriers; originally so called from its sweet taste. It is of much importance in veterinary practice, forming a more convenient. and I think a more efficacious, mode of making *Goulard water,* as the solution of it is popularly called; but which water has been usually made from a preparation of litharge, called extract of saturn, or Goulard's extract. When this celebrated liquor is made from the dry acetate, do it as follows:

Goulard Water.—Take acetate of lead, one dram to two, proof spirit an ounce, soft water a pint. When the extract is preferred, make as follows:—Liquid acetate of lead, extract of saturn *(liquor plumbi acetatis),* one dram to two; proof spirit an ounce; soft water a pint. Either of these preparations of the acetate of lead are excellent, and justly appreciated applications, in superficial inflammations; but, to produce the full effect, the part affected should be kept constantly wet with one or the other of them. Internally, this preparation is inert: even four ounces have been given without producing any visible effect.

Lead, Carbonate of (Plumbi carbonas).—White lead is sometimes used as a desiccative, being sprinkled over a sore.

Lead, Litharge of (Plumbi oxydum semivitreum).—From this the celebrated extract of Goulard is made, which, infused in water, produces the Goulard wash, but which I prefer to make of the super-acetate or sugar of lead, as it is erroneously called.

LIME is, in some cases, when *quick,* a useful caustic; and, when pulverized, is found good to sprinkle over cankered feet, greasy heels, or any foul surface, where an absorption of moisture, as well as an escharotic process, are desirable.

LIME WATER.—Six pounds of lime, infused in two gallons of water, may, after standing three or four hours, be strained off, and kept in a *close stopped* bottle for use, without which care it will be useless. Lime water is a good application for mange, and is also sometimes recommended internally for obstinate coughs and gravelly complaints.

LINIMENT is a fluid preparation of oil and other matters.

LINSEED.—The seeds boiled form a thick mucilaginous demulcent drink, used in catarrh, sore throat, and all chest affections. *Linseed powder* makes a convenient poultice, particularly where a close application of the poulticing medium is required.

LIQUID BLISTER.—See BLISTER; see, also, SWEATING BLISTER.

LIQUOR AMMONIÆ ACETATIS.—See ACETATED LIQUOR OF AMMONIA.

LIQUORICE, like linseed, entered into the composition of numerous old recipes, but, in this way, the virtues of neither, particularly of the latter, are very conspicuous.

LITHARGE.—See LEAD.

LOTIONS.—See WASHES.

LYTTA VESSICATORIA—See CANTHARIDES.

MADDER.—Much dependence used to be placed on the virtues of this, among old farriers, in diseases of the stomach and liver, as well as in farcy. It was also considered as a preventive against the effects of venomous bites. In farcy, I have witnessed some good from it, but not enough to deserve particular attention. In other respects, I believe it does not merit much notice.

MAGNESIÆ SULPHAS.—See SULPHATE OF MAGNESIA.

MALT.—This forms an excellent cordial in cases of debility, and, when continued, it becomes a permanent tonic. It has also some pectoral qualities; but in active inflammations of the chest it is too stimulant. Malt is also an excellent alterative. In farcy, in grease, and in mange also, when accompanied with emaciation, I have used it with extreme efficacy: but, in such cases, it should be given in considerable quantities without other corn, and even with as little hay as possible, so that almost all the nutriment received by the constitution may be by the malt. This practice is not generally known, but it has proved with me, in some cases, singularly efficacious. The best mode of giving malt is by mashes.—See MASHES.

MARSHMALLOWS.—Either the leaves, stalks, or roots, when boiled, yield a mucilaginous liquor, formerly much used as a fomentation, and occasionally given internally as a demulcent; but it has fallen into disuse.

MASHES are much in request in stable management, and are made from oats, barley, bran, malt, linseed, and sometimes chaff. They are also given cold or warm; but, in either case, should always be hot when made. In making them, care is necessary to avoid smoking the water, and not to stir them with any thing dirty, or the horse, being a cleanly animal, will refuse them. The mode of making is sufficiently known: boiling water being poured on the bran, corn, or whatever is the subject of the mash, to the consistence, when stirred, of a poultice; it should be covered over, and suffered to remain an hour or two, unless it is to be given hot to steam the head, as in catarrh; but even here it should not be hung round the neck immediately, or it would alarm the horse. Some horses will not readily eat bran mashes without a handful of corn to make it palatable. When horses are weakly and much emaciated, it is prudent often to mash all their corn. The quantity intended for them the ensuing day may be put into a vessel the over night, and boiling water poured on it. In this way it is rendered more easy of digestion, and hence more nutritive. *Speared corn* has been sometimes recommended in the course of the Work; which is nothing more than malting a quantity, by putting cold water to it for twenty-four hours, and then spreading it on a floor two inches thick, which will soon make it sprout, when it may be given. In this way, it must be made from day to day, or it will become musty or mouldy.

MERCURIALS.—The various preparations of *quicksilver* are so called, and may be seen under their several names, as submuriate of, or calomel; oxymuriate of, or corrosive sublimate; nitrous oxyde of, or red precipitate; precipitated quicksilver, or white precipitate.

MERCURIAL OINTMENT (*Unguentum hydrargyri*).—Unless the utmost confidence can be placed in the druggist employed, the practitioner would act prudently in making this ointment himself; for it is too common to adulterate it: indeed, it is hardly possible to purchase it of a druggist of the strength prescribed by the pharmacopœia. It is a useful assistant in mange ointments. Before blistering, or firing a splent, it may be rubbed on the part for a week, with benefit. When it is used extensively, its effects should be watched, as, sometimes, a small quantity will salivate. I once affected the mouth of a horse of my own, by rubbing in three drams daily for three days only.

MINDERERUS'S SPIRIT (*Liquor ammoniæ acetatis*).—This is made by pouring a quart of vinegar on an ounce of volatile salt of ammonia. It may be also made by taking any quantity of spirit of hartshorn, and adding vinegar to it till it tastes neither salt nor sour. I consider it as a very important medicine in horse practice; it gently invigorates, is diaphoretic, and sometimes it proves mildly diuretic. It principally shews its salutary effects on the commencement of the debile stage, or at the close of lingering febrile diseases, particularly of the epidemic catarrh; in which cases it may be combined with camphor, but more particularly with powdered camomile (see CAMOMILE). In the more early stages of the epidemic catarrh, it may be united with nitre and oxymel. The dose is from four to six ounces. In strains and ligamentary lamenesses it forms a very useful external application also.—See ACETATED LIQUOR OF AMMONIA.

MINT and PEPPERMINT.—See OIL.

MYRRH.—This excellent gum resin is a valuable tonic to the horse, in doses of an ounce, particularly if united with salt of steel, and any warm bitter. There are two tinctures of it; one simple, and one compounded with aloes: both of which are much used externally as warm digestives.

NARCOTICS are not altogether similar in their action to antispasmodics or anodynes; but the analogy is so considerable, that, in the present instance, it is not necessary to separate the consideration of them from what lessens irritation and eases pain.—See ANTISPASMODICS and ANODYNES.

NATRON.—See SODA.

NITRATE OF SILVER (called *lunar caustic*).—See CAUSTICS.

NITRATE OF POTASH (*Nitras potassæ*) NITRE.—The nitrate of potash is the most powerful refrigerant we know. It greatly diminishes febrile action, and determines more certainly to the kidnies than any of the saline articles we use. It is also antiseptic and diaphoretic, and therefore of great consequence in active fever, given two or three times a day in doses of three or four drams. As an alterative it is also well known.- See ALTERATIVES.

Nitre, Sweet Spirit of (Spiritus ætheris nitrici).—This is a valuable preparation of nitre, inasmuch as it is a refrigerant, and yet, in some measure, a cordial, from its æthereal composition; therefore it is a useful medicine in the more advanced stages of fever, in doses of an ounce two or three times a day. It is also a useful article to give in the immediate approach of the first cold fit of fever, in a dose of two ounces.—See FEVER.

NITROUS ACID (*Acidum nitrosum dilutum*), or *aquafortis.*—See CAUSTICS.

OAK BARK.—See BARKS.

OILS.—These are either fixed or volatile. The *fixed oils* are so called because they are not liable to be changed into vapour but under a high degree of temperature, and are also generally gained in quantities by expression. The *volatile oils*, on the contrary, are produced by distillation, and evaporate by a moderate heat. The fixed kind, in horse practice, are:—

Oil of Elder, which is only common oil tinged with elder, or sometimes with verdigris.

Oil of Bay is an expressed oil from bay berries.

Oil of Castor.—See CASTOR OIL.—In very large doses this occasions some disturbance in the bowels, and does not often operate as a laxative; but in doses of eight or ten ounces, repeated every five or six hours, it proves frequently an excellent laxative when more drastic matters are inadmissible. It is apt to be decried, and numerous experiments are detailed to prove that it is noxious as well as inert, but hardly any two experiments agree. I have given it for years, without experiencing any ill effect, but often the best, from its use. It can never gain a character as a certain aperient; it is, on the contrary, an uncertain one, unless joined with a watery tincture of aloes, or with neutral salts, when the mixture seldom fails, if mashes have been in use.

Oil of Olives.—The best olive oil may be substituted for castor oil, when the latter cannot be obtained. It is the principal medium in the composition of liniments, and enters into many ointments.

Oil of Linseed.—This is considered as a pectoral by the older farriers, and was formerly much used in coughs, but is now seldom given. It is also a pretty certain laxative, and is certainly more to be depended on than olive or even castor oil.

Oil of Palm.—Country practitioners hardly know there is such an article as this, which has the consistence and all the other properties of lard, with the addition of a most fragrant smell. In quantities it may be also purchased cheaper than lard, and, as it does not become rancid, it is greatly to be preferred.

The *essential* or *volatile* oils are,—

Oil of Amber.—An antispasmodic not much in use. It is said to have a peculiar property of hastening the action of aloes.

Oil of Anise Seeds.—This is an elegant warm aromatic, and may very properly be added to cordial balls, in doses of ten to thirty drops.

Oil of Caraways may be used in the same way, and considered in a similar point of view.

Oil of Juniper.—This is often added to diuretic balls, to increase their effect: it acts, however, principally as a warm aromatic.

Oil of Lemon.—This is principally used to disguise the smell of nauseous articles: I have, however, given it in colic with much benefit. In one instance, two ounces, with four ounces of common oil, produced immediate relief.

Oil of Petre is only Barbadoes tar in oil of turpentine.

Oil of Tar is a cheap penetrating distillation from tar, that may be substituted for turpentine.

Oil of Turpentine —See TURPENTINE.

Oil of Origanum.—This warm penetrating oil was formerly much used among farriers as an external stimulant; but it possesses no powers superior to turpentine, and is therefore little used by modern practitioners.

Oil of Spike.—To this, also, the older farriers attributed superior efficacy, although it was nothing more than oil of turpentine coloured with alkanet root.

Oil of Vitriol.—See SULPHURIC ACID.

OINTMENTS are greasy applications for covering excoriated surfaces. The numerous preparations of this kind are much reduced in number; for, although some certainly have a salutary influence on a wound, yet, after all, their principal merit is in the defence they afford.

ONIONS.—In domestic practice the juice of three or four onions in half a pint of sound ale or gin, has relieved flatulent colic. The French, in such cases, introduce a large one up the anus.

OPIUM.—I believe it has been attempted to prove that this valuable antispasmodic is nearly inert in the horse; but, let the student be aware that no theory can overturn facts, nor any private views long smother public benefit. Opium has a most salutary and active effect on the horse. In spasmodic colic its benefits are particularly observable in doses of two to three drams; in which cases, also, it may be given in clysters as well. It greatly assists the action of astringents in diarrhœa; and, in profuse staling, united with alum and catechu, it has proved singularly efficacious; as also in difficult staling not dependent on inflammation. In farcy and skin complaints, it combats the ill effects of too large doses of active minerals. It increases the pulse, in repeated doses of one to two drams every six hours; hence it is an useful auxiliary remedy in the debile stages of fever.

Laudanum is the tincture of opium, but it is too diffused for much use in horse practice, unless when a very small dose is required. A watery solution may, however, be made strong, and the whole given; that is, sediment and all.—See TINCTURES.

OPODELDOC (*Linimentum saponis compositum*) has given place to more active remedies; it may, however, be still employed in slight strains and bruises.

ORIGANUM.—See OILS.

OXYMEL, SIMPLE.—This is made by simmering a pint of vinegar with two pounds of honey. Sugar is sometimes substituted, but this is never advisable, as it destroys, I am disposed to think, a considerable portion of the efficacy of the compound. Oxymel, properly made, will be found a most valuable remedy in pneumonia, and all catarrhal affections; particularly in conjunction with nitre, tartar emetic, and foxglove. The dose is from four to six ounces.

OXYMEL OF SQUILLS.—In chronic coughs, or in catarrhal affections, where the cough remains obstinate, and yet no active fever is present, this may sometimes take place of the other, in doses of three to four ounces; but, as a general medicine, the other is greatly to be preferred.

OXYMURIATE OF QUICKSILVER (*Hydrargyrus oxymurias*), popularly called corrosive sublimate, forms an excellent medical agent in judicious hands. As an alterative, it may be given in doses of ten to twenty grains daily. In glanders and farcy this quantity may be gradually increased to as much as the horse will bear without inconvenience; but as its noxious effects are often sudden, so it must be most carefully watched. It proves also a very certain diuretic in large doses (see DIURETICS). *Externally*, also, its effects are considerable. As an escharotic it has already been noticed among *Caustics*. It forms a useful wash for mange, and is an excellent auxiliary to the stimulant properties of blisters, when used for exostosis.

PALM OIL.—See OILS.

PECTORALS are medicines that exert their healing influence principally on the chest; thus they include expectorants, demulcents, and emollients. Pectorals, in horse practice, may be considered as of two kinds: such as allay inflammation, as the remedies used in pneumonia; and such as allay topical irritation simply, as those recommended in chronic cough.

PEPPERS.—The various kinds of peppers are sometimes used by farriers, particularly in colic. Mr. B. Clark has written a treatise expressly on the virtues of the pimento berry (see COLIC). As a domestic remedy, either of them may be very properly given in doses of three drams to six; except the Cayenne, which, as being very strong, admits of only a dram as a dose. The peppers are sometimes used as a stomachic, or to warm other more permanent tonics, as steel, bitters, &c.

PHYSIC.—See CATHARTICS.

PITCH is used to give a consistence and adhesiveness to plaisters and ointments; and is also the basis of charges. It has as much *medicinal* quality as its relationship with terebinthinated substances allows it.

POTASSÆ SUBCARBONAS, or POTASH.—See CARBONATE OF POTASH, in contradistinction to soda, which is termed the *mineral alkali*. Potash is, in itself, seldom used but as a caustic (which see); but its combinations frequently enter veterinary practice (see CREAM OF TARTAR), which is the supertartrate of potash; and *nitre*, the nitrate of potash.

POTASSÆ SUPERTARTRAS.—See SUPERTARTRATE OF POTASH, or CREAM OF TARTAR.

POULTICES.—In veterinary practice, bread would be too expensive an article to make poultices of in common cases. Bran, therefore, is very commonly used; and, to give it a proper consistence, some linseed meal, if thought necessary, may be mixed with it; or, in default of this, a little of any other meal. A *poultice* should be made of a sufficient consistence, that it may not run through the cloth it is put in; and yet it should not be so thick as to dry too quickly, for a poultice acts principally by its moisture; therefore it should be frequently wetted through the cloth with the predominating fluid, of whatever kind. In applying poultices to the legs, care should be taken not to tie them too tight, as is frequently done, and thereby the mischief aggravated instead of relieved. A piece of broad list is, for this reason, very proper to fasten them on with. They should also never be applied too hot; very little good can be derived from it, and much pain may be occasioned. A hot poultice soon comes to the heat of the part; and as, in most cases requiring them, the part, at the moment of application, is in a state of comparative debility, too great heat only farther weakens it. Poultices are likewise, in many cases, applied cold, as in some strains, and in affections of the eye. A very convenient mode of applying a poultice to the extremities, is by means of an old worsted stocking cut off at the ancle. The leg of it being slipped over the hoof, is brought around the part, and secured below by means of broad list not too tightly applied. The poultice is then put into the stocking by means of the hand, and afterwards secured above by another piece of broad tape loosely applied; after which the top of the stocking may be folded down over it. In cases where it is found difficult to keep a poultice on any part of the extremities, from its inclination to slip down, still by no means tighten the supporting bandage; but, instead, pass a long tape from it over the withers, or back, if behind, and attach it to the other side of the bandage; it will then be effectually secured from slipping.

A common softening Poultice.

Bran, any quantity; pour on it boiling water, to form a thin paste; add linseed meal sufficient to make it adhesive. After this, stir in one or two ounces of sweet oil.

A cooling Poultice.

Bran, any quantity; pour on it a sufficient quantity of cold Goulard water to form a poultice; which, as it dries, moisten with more Goulard water.

Cleansing Poultices for Grease, or ichorous Discharges from other diseased Surfaces, or for gangrenous Wounds.

Oatmeal	half a pint
Linseed meal	ditto
Powdered charcoal	four ounces

Stale beer grounds, sufficient to make a poultice.

Or,

Carrots, scraped, sufficient to make a poultice.

Or,

Boil and mash turnips, sufficient to make a poultice.

To either of these, four ounces of powdered charcoal may be added, if thought proper. Or,

Linseed meal, or oatmeal flour, any quantity; mix with boiling water, and ferment with a table spoonful of yeast: as it rises, apply to the part.

In cases of extensive gangrene, an ounce or two of oil of turpentine may be added to either of these poultices.

Powders.—Pulverized medicines, without much taste, may be conveniently given by mixing with a mash, or in the corn. If the latter, and the matters given are very dry and light, the corn should be first sprinkled with water, to prevent the powder being blown away by the horse breathing or snorting. But whenever a horse is delicate in his stomach, and refuses his food on this account, it should not be persisted in.

Precipitate, Red *(Hydrargyri nitrico oxydum)* is the red nitrated quicksilver of the former dispensatory (see Caustics). The white precipitate is seldom used among brutes.

Purges.—See Cathartics.

Quassia, a useful bitter in doses of six to ten drams.

Raking is a method of emptying the bowels by means of the hand. The right-hand arm being stripped and oiled, with the left hand the tail is drawn aside, when the right being made as small as possible, and cone like, should be gently introduced up the fundament, and any quantity of hardened excrement the hand meets with carefully removed in small pieces. From this it will be at once evident that *back raking* must be useful in a vast variety of cases. It should always be made use of previous to giving a clyster, otherwise the hardened matter may prevent the passage of the fluid. It is also always proper in colic; and in all cases of costiveness it should never be dispensed with.

Repellents. -Medicines whose action was supposed to consist in driving back humours from one part to another. Modern physiology allows no such action; and it appears, from the theories now received, that all repellents, as they were termed, act simply by their tonic power.

Resin, commonly called rosin, is either yellow or black. The yellow is the one used in veterinary practice; internally as a diuretic (see Diuretics); and, externally, in charges, plaisters, &c.

Roses, Red Conserve of.—See Conserves.

Rowelling.—Rowels act like blisters by inflaming the surface, whereby more deep-seated inflammations are removed; but it is evident they cannot act either so quickly or so extensively; yet they are more convenient often, and more permanent in their action. The common mode of making a rowel is sufficiently known. A slit being cut in the skin, about an inch in length, the finger, or a blunt horn, is introduced to separate it from the surrounding flesh, in a circle of two inches in diameter; into which is introduced something to prevent the reunion of the skin. A piece of circular leather tolerably stiff, with a central hole, is a very common substance used. When the inflammation to be raised is required to be speedy, this leather is smeared with blistering ointment, otherwise with basilicon. By the improvements in veterinary instruments, a bistory is now used, that renders the introduction of the finger unnecessary.—See INSTRUMENTS, at the end.

RUE, joined with box, has been thought to be an antidote to the effects of the bite of the rabid dog. I have myself witnessed the preventive powers of this mixture; but I am disposed to attribute the principal efficacy to the box (see RABIES, p. 511). As a remedy in farcy, worms, and grease, in all which it was formerly used, it has little virtue.

SALINE EMBROCATION.—See EMBROCATIONS.

SALTS are divided into acids, alkalies, and neutrals.

Common Salt.—This is a useful remedy in veterinary practice; for when Epsom or Glauber's salt cannot be conveniently got at, this may be substituted as an aperient. It also proves itself a vermifuge, and in solution assists the effects of opening clysters. It may be given in doses of from six to eight ounces. In the proportion of a dram to six ounces of water, it has been found an excellent collyrium for ophthalmia when the first inflammatory irritation has subsided.

Sal Ammoniac (Ammoniæ murias).—*Crude* sal ammoniac, so called in contradistinction to the volatile or prepared ammoniacal salt before described, when dissolved in vinegar, is an excellent application for torpid swellings, strains, and bruises; but it is not more efficacious than the saline embrocation, which see.

Sal Indus.—A new salt, said to be an excellent vermifuge, particularly against bots, but I have always found it nearly inert. All salines however are, in some degree, vermifuges, and more particularly to bots.

Salt of Steel.—See IRON.

Salt of Tartar.—See POTASH.

SAVIN.—This was formerly strongly recommended as a powerful vermifuge. I have sometimes seen worms come away when it has been given, particularly by considerable doses of the essential oil, as five or six drams; but I consider it altogether as less efficacious than those vermifuges already noticed.

SEA WATER.—For the same purposes that common salt is given, sea water may also be employed in doses of two or three pints. Some horses will drink it of themselves; and persons living on the sea coast affirm, that it is not uncommon for a horse out of condition to break away and go to the sea side to drink, as though impressed with an instinctive knowledge of the efficacy of it as an alterative or vermifuge. It is remarkable, however, that horses on the sea coast seldom carry a fine coat, which can only arise from the action of the sea air on them.

SODA is the *mineral* alkali, whose medicinal properties do not differ materially from potash, or the vegetable alkali, which see.

SPANISH FLIES.—See CANTHARIDES.

SQUILLS (*Scilla maritima*).—Squills are highly recommended by Mr. White; but I cannot speak in equal terms of their efficacy in the cases I have tried them. As an expectorant, however, they may, perhaps, assist other remedies.—See OXYMEL OF SQUILLS.

STARCH.—In diarrhœa, starch clysters have proved very useful. It may also be given internally in such cases, united with chalk and opium.

STIMULANTS are medicines that exert an influence on the system, by increasing the power and action of a part, or of the whole of it; hence they may be considered as very numerous, and the term as of very extensive signification: but the veterinarian's purpose will be fully answered, by considering the various stimuli under the heads CORDIALS, STOMACHICS, and TONICS, which see.

STOMACHICS are intended to express such medicines as act more immediately by determining a greater quantity of blood to the stomach, hence increasing the secretion of its gastric juice, as warm spicy bitters, &c.; or those supposed to act by strengthening its muscular tone, as bark, steel, acids, &c. Hence stomachics are only a more permanent cordial or stimulant. The remedies that may be considered as meriting this appellation, beyond those abovementioned, are diffused through the *Materia Medica*. The following formulæ will, however, be a clue to the veterinarian, and either of them will, on trial, be found to answer the end proposed.

Oak bark	six drams
Aloes	one dram
Ginger	one dram
Sulphate of copper (*blue vitriol*)	one dram.

Make into a ball with honey, lard, or conserve of roses.

Oak bark	four ounces
Watery tincture of aloes	four ounces
Ginger, in powder	half an ounce
Forge water	three pints.

Boil the oak bark (first bruised) in the forge water, and when cold add the infusion of aloes and ginger, and divide into four drinks.

Gum myrrh	two drams
Mustard flour	one dram
Opium	five grains
Camomile powder	four drams
Camphor	half a dram.

Make into a ball with thin Venice turpentine.

Powdered gentian	four drams
Powdered quassia	four drams
Powdered opium	five grains
Oil of juniper	twenty drops.

Make into a ball with Venice turpentine.

STOPPINGS are articles introduced into the hollow of the bottom of the hoof, to moisten the horn; and in other instances also, as in cases of pricks, corns, or bruised soles. For the first purpose, any thing that will retain moisture may be used: the following will be found as good as any, as it not only moistens but toughens the horn.

Cow dung and horse dung, mixed	six parts
Tar	one part.

Clay is not a good stopping. It dries too soon, and then rather adds to the evil of hardening the hoof than diminishing it. In cases of pricks, &c., hot tar is not improperly used as a stopping. Pieces of tow are dipped into it, and are then retained by means of tough strips of wood, as withy from the broom binding, which may be laid across. Oil of turpentine one part, horse turpentine one part, and grease a third part, make also a good warm drawing stopping for similar purposes; but it should be always first considered whether the case requires stimulating.

STORAX.—See BALSAMS.

STYPTICS are remedies that restrain hæmorrhage, either internally or externally. Those used in the former case are vitriol, alum, and catechu; in the latter, vitriol and alum, together with such articles as coagulate the blood either mechanically or chemically, and thus plug up the open vessel.

SUBLIMATE.—See CORROSIVE SUBLIMATE.

SUDORIFICS.—These are uncertain remedies in the horse. We can procure a slight relaxation of skin, by diluents, warmth, and diaphoretic medicines; but actual perspiration we can seldom excite, except by violent nauseants. Vinegar, however, in frequently repeated doses of six ounces, will generally produce it; but it appears to excite much action in the system, and hence not to be recommended. Increased cloathing will generally produce it; but by exciting increased action, it may do more harm than good. In common cases, it will be therefore prudent to content ourselves with diluents, antimonials, and Mindererus's spirit. In important ones we may use nauseants.

SULPHUR.—Flour of sulphur is a very common remedy in veterinary practice, internally as an alterative, and externally as a cure of eruptions of the skin. For the latter purpose, the black sulphur, which is cheaper, is equally proper.

SULPHURIC ACID, or Oil of Vitriol (*Acidum sulphuricum*), as it is popularly termed, is a preparation from sulphur, which is seldom used in horse practice but as an escharotic, or added to blistering substances to increase their activity.

SULPHUR, BALSAM OF (*Oleum sulphuretum*).—Brimstone, boiled in oil, was used formerly to be called a balsam; and was then much used among farriers in old coughs, and thick wind; but, as may be supposed, with little advantage. Annisated balsam of sulphur was made by adding oil of aniseed to the former.

SULPHATE OF COPPER.—See BLUE VITRIOL.

SULPHURET OF QUICKSILVER (*Sulphuretum hydrargyri nigrum*), or Æthiops Mineral, is not very frequently used in horse practice, both on account of its cost, and because its virtues are not sufficiently known; but in surfeits, and some other cases of what are called foulnesses, six drams of it with twelve of cream of tartar, given daily, forms the best possible alterative.

SULPHATE OF MAGNESIA (*Magnesiæ sulphas*), Epsom Salts, or bitter purging salt, so well known, is a valuable medicine oftentimes to the veterinarian; much more so than the sulphate of soda, or Glauber's salt. In cases requiring a loose state of bowels, but where aloes are inadmissible, as in inflammatory affections, this salt is often a resource. In fevers it appears to have a double effect; one as a febrifuge, the other as an aperient. It requires from six or eight ounces to twelve, dissolved in water or gruel, to open the bowels; and sometimes it is necessary to repeat the dose before the effect is produced.

It cannot, therefore, be considered altogether as a certain laxative; but when combined with linseed or castor oil, it seldom fails, particularly if assisted by bran mashes. In opening clysters also it may be very properly added.

Supertartrate of Potash (*Potassæ supertartras*), or Cream of Tartar.—This also has been said to be inert in the horse; but I think the assertion erroneous: on the contrary, I consider it as possessing a high degree of efficacy as an alterative, in doses of one ounce to two, particularly in combination with Æthiops mineral. It acts also as a mild diuretic, and is therefore very proper in œdematous swellings as well as skin affections, united with nitre, &c. It is likewise a valuable auxiliary refrigerant in fevers.

Sweating Blister.—This is only a more mild epispastic, and simply occasions heat and swelling, without excoriation or loss of hair; consequently it is a very convenient application, when it is an object to avoid a blemish, and when the case is not a very desperate one. But there are also instances in which it is to be preferred to an actual blister, as in recent strains, where the whole of the heat and inflammation is not yet abated: in such cases the sweating blister is often very efficacious. The mode of application is to apply it by rubbing it in of sufficient strength to irritate in a mild degree only, rubbing it well in every day, until considerable swelling is occasioned, when the application should be desisted from, and the swelling suffered to subside. The formula for sweating or liquid blister is among Blisters, which see.

Sweet Spirit of Nitre.—See Nitre.

Tar is a very useful article to the veterinarian. Equal parts of tar and fish oil make an excellent application for the hoofs of horses, applied daily with a brush, the hoofs being previously moistened. Tar is also an excellent stopping for the bottom of the feet, in the proportion described under Stoppings. It is also either alone, or mixed with oil of turpentine, and applied warm, often used with advantage as a stopping in pricks and bruises of the sole. Tar enters also into some of the digestive and detergent unguents; particularly in preparations for the cure of thrushes in the feet. Tar has also been given inwardly in balls, and the water of tar as a drink in obstinate chronic coughs; and when joined with expectorants and alteratives, particularly of the mercurial kind, benefit has been often received from it in these cases.

Tar, Barbadoes.—This is valued more highly as an internal remedy for coughs, than the common tar; but, as far as my experience goes, it merits no preference.

Tartar.—See Cream of.

Tartarised Antimony (*Antimonii tartarisatum*), or Emetic Tartar.—This is a new remedy in veterinary practice, and not generally sanctioned; but the practitioner will find, I think, reason for its future employment when he has tried it a few times. It is both a febrifuge and expectorant; and, as most of the fevers of horses are connected with some pneumonic affection, so a remedy that combines the properties of diminishing action, and increasing expectoration, is invaluable. In active pneumonia, I unite it with nitre, foxglove, and oxymel, in doses of one to two drams, two or three times a day. In lesser cases, it may be given with nitre and cream of tartar, in similar doses, once a day, in a mash. It is also an excellent alterative (see ALTERATIVES). In full doses it determines to the skin, and ultimately lessens the action of the heart and arteries: sometimes it increases the flow of urine. In extolling this preparation of antimony, or indeed in praising the virtues of any preparation of this mineral, I am at variance with some, nay, with most of the best veterinarians of the present day: I therefore continue to recommend it with cautionary notice to the reader. One, two, or more ounces, have been given without exciting any peculiar symptoms. What therefore is to be expected, it may be asked, from two or three drams? I have only to ask in return, Are not minute successive doses of many medicaments useful where large ones fail, if given at once? My experience is my guide: I have found it to allay arterial action, and to promote pectoral secretion; ought I not therefore to recommend it?

TENTS are substances introduced into a wound, to prevent its too early closing. In deep wounds having a narrow outlet, and when any foreign body remains to be expelled, they may be very properly employed; and any soft substance, as lint or tow, may be introduced for this purpose. But the old plan of the farriers, of cramming every wound with tents, is an absurd and hurtful practice.

TIN.—This is given as a vermifuge to horses frequently. It has however but moderate efficacy, and, when given, it should be always in fine filings, and not levigated; as there is reason to believe its action is purely mechanical; in which case, tin must be preferable to pewter filings, as being harder, but which are generally substituted. Dose, three ounces daily.

TINCTURES, are solutions of vegetable or other matter in spirituous liquors. When any of the resinous gums are to be dissolved, pure spirit of wine should be used. When the roots, bark, leaves, &c. of plants are to be made into tinctures, dilute spirit is sufficient. Tinctures are not, in general, a convenient formulæ for the veterinarian. The substances employed are too diffused, and cannot be given in general cases in sufficient quantity, without using an unnecessary and even hurtful portion of the spirit or menstruum. But as sometimes it may be wished to give either aloes or opium diluted; so a watery solution or tincture might be wished. In these cases, equal weights of the substance and of proof spirit may be digested together in a warm place for two days, and then the united articles may have double the weight of water added; and in this state the tincture may be kept for use. In giving it, the bottle must be shaken, and the sediment and all poured out. Any of the tinctures of the human pharmacopœia may occasionally be employed in veterinary practice, but, for the above reasons, this will never be a very useful formula. The principal ones in use are tincture of aloes; tincture of aloes with myrrh; tincture of benjamin compounded, called friars balsam; tincture of myrrh; and tincture of Spanish flies, all of which are occasionally used as detergents. Internally also, all of them, except the tincture of aloes, are stomachics and tonics. Tincture of catechu likewise may sometimes be useful in restringent drinks. The tincture of opium also made as above, or a stronger laudanum, would be useful. Foxglove, as being a powerful remedy, may be very usefully given in tincture; and for convenience, the veterinarian may keep this also of double strength to what is ordered in the Pharmacopœia.

TOBACCO.—This is a very powerful narcotic. An instance is mentioned by Mr. White, of two ounces having been given by an ignorant groom to produce a fine coat, which occasioned almost immediate death. But this very activity, when we are better acquainted with its mode of action, may be made subservient to important medicinal purposes. Externally, tobacco is very useful in infusion, as an external remedy for mange.

TONICS are supposed to exert their influence on the muscular fibre, and to improve their tone: this they do, in some instances, through the medium of the stomach, and are then called stomachics (which see); or they are received into the blood, and then become a very part of the fibre themselves. *Tonics* are, therefore, stimulants of permanent action; and from which may be gained, that this class is numerous, and is, in fact, diffused through the whole materia medica. A complete knowledge of their numbers and their effects can only be gained by an intimate conversance with the animal economy, and the nature of the various foreign agents employed in acting upon it. As a guide to the junior veterinarian and amateur, a few formulæ, that I have found by experience to be efficient, are added; either of which may be given daily.

Gum myrrh	three drams
Green vitriol	two drams
Oak bark, powdered	three drams
Ginger, ditto	one dram.

Mix into a ball with conserve of roses; or into a drink with a pint of camomile tea.

Arsenic	Ten grains
Gentian, powdered	three drams
Cascarilla, ditto	three drams.

Mix into a ball with conserve of roses, or, as above, into a drink.

Gum myrrh	three drams
Balsam of Tolu and of Peru, of each	one dram
Liquid storax	ditto
Levigated rust of iron	two drams.

Make into a ball.

Lunar caustic, fifteen grains, dissolved carefully in strong camomile infusion, one pint, forms likewise a most excellent permanent tonic to the horse.—Or,

Blue vitriol	half an ounce
Ginger	one dram
Powdered willow bark	three drams.

Make into a ball with conserve of roses.

In cases where either the sulphate of iron or the sulphate of copper is used, I would recommend that it be not given on an empty stomach, but after the horse has had about two quarts of water and a lock or two of hay.

TURNER'S CERATE.—See CERATES.

TURPENTINE forms an article of very considerable importance in veterinary medicine. There is no great difference between the Venice and the common, which are the kinds principally used in our practice. Turpentine is a considerable ingredient in digestive and blistering ointments, and is also a convenient adhesive medium for forming balls.

Internally, it is a warm stomachic; an excellent assistant diuretic; and has some vermifuge powers.

Turpentine, Oil of.—This terebinthinated preparation is still more in use than the massy turpentine. Internally, in doses of two to four ounces, it forms an excellent antispasmodic in flatulent colic, and in similar daily doses it is one of the most effectual vermifuges. In both chronic and acute indigestion it is also serviceable. Externally, its use is still more frequent: it is a ready and never-failing stimulant, and hence it is the basis of the sweating blister; and, more dilute, it forms the best application for old strains and bruises.

Unguents.—A derivative name for ointments; which see.

Verdigris (*Ærugo*).—See Acetate of Copper.

Verjuice is only an apple vinegar, and hence applicable to similar purposes with the common kind.

Vermifuges.—See Anthelmintics.

Vesicatories, blistering articles.—See Blisters.

Vitriol (*Sulphas zinci*).—White vitriol, or sulphate of zinc, is an excellent styptic and astringent; it is also a good tonic, in doses of four to six drams. In ophthalmia it forms the best wash for the middle and latter stages. It is also a good detergent in grease and other ill-conditioned sores.

Vitriolated Copper.—See Blue Vitriol.

Vitriolated Iron.—See Green Vitriol.

Vitriol, Oil of.—See Sulphuric Acid.

Vinegar (*Acetum*).—The acetous acid is very frequently used in veterinary practice; it is of the utmost consequence, therefore, that it should be pure. It is, however, unfortunately, very liable to be adulterated with, or wholly made of, sulphuric acid, and then becomes very unfit for use as an internal remedy, being changed into an active stimulant instead of a refrigerant. Vinegar, not neutralized by salt or sugar, is capable of proving very noxious to the horse. We have instances on record, of a pint of strong vinegar destroying life; but, neutralized with carbonate of ammonia, it forms a most excellent febrifuge, under the old name of Mindererus's Spirit. Neutralized with sugar or honey, it forms a valuable expectorant, called oxymel. As an external application, the acetous acid is likewise no less useful. In strains, bruises, and other local injuries, it is the base of the best remedies, either in combination with acetate of lead when active inflammation exists, or mixed with crude sal ammoniac, or the bay salt, to counteract the effects of distention.—See Saline Embrocation.

Vinegar, Distilled.—This elegant preparation is nothing more than the common vinegar deprived of its water and feculent parts, but is in no respect preferable for the purposes of horse practice.

Washes are watery solutions, or infusions, of various substances, to be *washed* over the parts to which they are to be applied.

Wax, White and Yellow.—The yellow is principally used by the veterinarian, to thicken and give consistence to ointments.

Willow Bark.—See Bark.

Worm Medicines.—See Anthelmintics.

Zinc.—See Vitriol and Calamine.

INDEX.

R. LONG,

VETERINARY INSTRUMENT MAKER

TO

HIS MAJESTY, THE VETERINARY COLLEGE, AND THE ARMY,

217, HIGH HOLBORN,

(Opposite Southampton Street, Bloomsbury Square, London)

BEGS to return his most grateful thanks for the liberal encouragement he has received, as well as for the valuable hints for improvement in Veterinary Instruments that have been suggested to him by different ingenious practitioners in the art, which he has already adopted to the great benefit of this useful branch of the mechanics, and which he shall continue to adopt as he may be favoured with future ones. R. LONG likewise solicits an inspection of some improvements of his own that have been honoured with public approbation. The following list is selected from a vast variety, constantly on sale, manufactured, wholly by himself, of the best materials, and the most moderate prices:—

POCKET INSTRUMENTS, fitted up complete, of various kinds.

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