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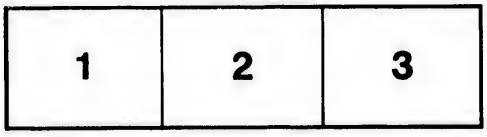

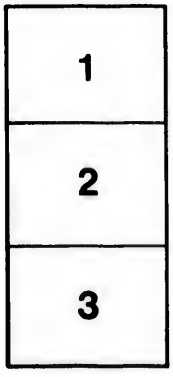

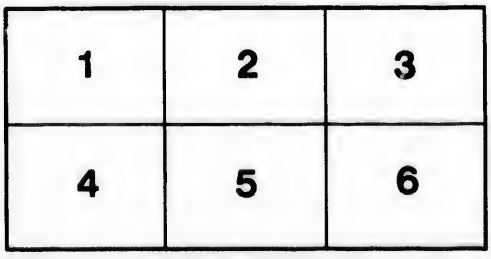

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SERIES

OF

QUESTIONS ON BREEDING

AND THE

HEREDITARY DISEASES

OF

HORSES AND CATTLE,

BY

W. H. CARPENTER,

VETERINARY SURGEON.—ROYAL ARTILLERY.

QUEBEC:

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St. John Street.

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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 an intimate acquaintance with the structure, functions, and economy of the bodies of these animals: and which acquirements, therefore, form the ground-work. The position which any nation occupies in the scale of civilisation is exactly determinable by the industry of its people—the constitution of the human mind—the constitution of the human body—is of that character to render activity necessary for health, and to make repose destructive to every energy. The mutual dependence of mind and body renders it essential that an equal burthen should be thrown upon each. There is a beautiful balance between the intellectual and physical forces, which, if disturbed, leads to irregularities which are diseases. The mind we call immaterial. The body is essentially material; yet this material mass is quickened into motion by the influences of certain physical forces which hold a position—not well defined—between gross matters and the "spark of life." Light, heat, elec-

tricity, and other forces which the eye of the philosopher sees, but which he has not yet grasped, are necessary agents to the existence of the organized mass we call man, but they are not the cause of that existence, an unknown energy, far beyond the reach of the most giant mind, which we call life, is hidden behind the veil, and the physical agencies, like the lightnings around the sacred mount, hide the divinity which crowns it. Yet are this gross organic mass, these physical forces, and the ethereal life bound together in a wonderful system to maintain the health of life, even in its highest developments of intellect, a change of form in some portion of the material constitution is necessary. The exercise of the mind in the development of a single thought compels a portion of human muscle to change its form—in common language to be destroyed; it is in fact resolved from its compound condition into its more simple elements. Every thought, therefore, according to its energy—its intensity is dependant upon a chemical change. Thus a mind of excessive energy, with an intensification of power, wears out the body faster than the material elements can be supplied.

On the other hand, if the material elements required to restore the waste in our bodies be supplied in too great abundance, the machinery is clogged, the mind becomes inactive, the power of appropriation and assimilation is reduced, and man becomes a sensual creation merely. Bodily efforts, the exertion of muscular force, the deve-

lopment of mechanical power, calling upon the system for an active restoration of the employed material, leaves but little for the mind to work upon, and consequently intellectual power and great bodily exertion are not compatible.

Nature performs all her works by a system of constants. The change of a constant quantity of matter is required to produce the development of a constant quantity of the spiritual energy. The development of an equivalent of mind requires the consumption of an equivalent of the material elements by which it is enchained. * * Civilization consists in producing the highest amount of vitality, the largest quantity of producing power and the most perfect development of mind a people—the most industrious will necessarily be the most virtuous and intellectual—it may be said that our over-laboured population do not answer to those conditions. Unfortunately it is too true they do not, and it is because they are over-laboured a great law is broken, and a great curse follows. Every sin carries its own punishment.

In a given time an over-wrought population produces less than the same number of men and women who have laboured fairly; the condition of the first is wreck of mind and of body; that of the second is the maintenance of health and capabilities for progress. Industry, therefore, is giving mind and body an equal and a fair amount of labour, and civilisation depends upon the proper fulfilment of the conditions of human existence. Man was placed on this planet with

powers to "replenish the earth and subdue it, and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth." In chemical constitution the vegetable and the animal tribes differ but little from man; the vegetable has life, and is by its influence developed; the animal has life of a higher order, and under its exciting power pursues a more enlarged round of existence. Man however, has more than this; and in the dignified possession of a soul, a world embracing, a world searching intelligence, he is enabled to exert his dominion over all things.

A beast may possess a remarkable power of instinct; we see the bird construct a wonderful nest; and the beaver build a remarkable cell, but these powers over nature are limited; neither the bird nor the beaver ever constructed a tool. Man, on the contrary, is enabled to avail himself, not merely of the raw material which nature gives him, but observing the laws upon which nature herself works, detecting the mechanical powers by which the universe is regulated, and the physical powers unceasingly at work in creation. He compels them, as slaves, to do his bidding. Man manufactures lever and wedges, he makes machines, which no other animal ever did. Man's supremacy entirely depends upon his so nicely adjusting the powers of mind and body, that he can make them equally available to the ends he aims at. The mental powers are exerted to discover the constitution of the earth, the creations

on its surface, and the physical forces by which all these are regulated. This is science. Without science there can be no advance. Truths become known to us only through the researches of science; therefore, the imperative necessity of so training the mind that it can search, and by seeking, find, whatever may be the form of science, its ends are no more than this. Having discovered truth, we seek to apply it, and every advance of any human industry is but an application of a known truth.

A SERIES

OF

QUESTIONS ON BREEDING.

The readers of this will remember that the questions proposed on the above subject are principally of a physiological character, and many of them were of such a nature that few persons perhaps were in a position to answer; while books on physiology, both human and comparative, are silent on the subject; hence we are desirous of putting on record the opinions we have already received. The profession will have observed that we did not ask how horses were bred, or the rules which breeders follow to secure the best stock, these being matters of detail only to be learned by experience; but we wished to know whether science could not assist the practical breeder, and thus bring physiological laws to bear on the question of propagating the species, in a manner that has not hitherto been effected. We regret to say that the information furnished us has not been so full as we could have wished; but if we should hereafter learn that our questions have caused the junior members of our profession to work in the sense we speak of, we shall have less reason to

regret our not being able at present to give all the assistance we are desirous of doing to breeders. His Royal Highness Prince Albert, in his recent speech at Birmingham, has so well put these, our opinions, before the public, that we shall be excused if we bring his observations before the profession, they being applicable to the subject of breeding. The Prince says:—"The introduction of science and art, as the regulators of productive industry, is destined to play a great and important part in the future development of this nation, and of the world in general." Science is eminently practical, and must be so, as she sees and knows what she is doing; while mere common practice is condemned to in the dark, applying natural ingenuity to unknown powers to obtain a known result. Far be it from me to undervalue the creative power of genius, or to treat shrewd common sense as worthless without knowledge. But nobody will tell me that the same genius would not take an incomparably higher flight if supplied with all the means which knowledge can impart; or that common sense does not become, in fact, only truly powerful when in possession of the materials upon which judgment is to be exercised. "In all our operations, whether agricultural or manufacturing, it is not we who operate, but the laws of nature, which we have set in operation, it is, then, of the highest importance that we should know these laws, in order to know what we are about, and the reason why certain things are which occur daily under our hands, and

what course we are to pursue with regard to them. Without such knowledge we are condemned to one of three states:—either we merely go on to do things just as our fathers did, and for no better reason than they did them so; or, trusting to some personal authority, we adopt at random the recommendation of some specific, in a speculative hope that it may answer; or, lastly—and this is the most favorable case—we ourselves improve upon certain processes; but this can only be the result of an experience hard earned and dearly bought, and which, after all, can only embrace a comparatively short space of time, and a small number of experiments. From none of these causes can we hope for much progress; for the mind, however ingenious, has no materials to work with, and remains in presence of phenomena, the causes of which are hidden from it. But these laws of nature—the divine laws—are capable of being discovered and understood, and of being taught, and made our own. This is the task of science; and, while science discovers and teaches these laws, art teaches their application. No pursuit is therefore, too insignificant not to be capable of becoming the subject both of a *science and an art.*"

We now proceed to our analysis.

REPLIES TO A SERIES

OF

QUESTIONS ON BREEDING.

Our correspondents inform us that, from the age of 4 years up to 30, an entire horse is used for the purpose of getting stock. On this question some very curious facts have been furnished us as to the advanced age at which horses will procreate their species. Mr. Gibbon speaks of a horse that got several foals when 33 years old. Many well authenticated instances can be found of horses getting stock quite as late in life as Mr. Gibbon has stated; and we have heard, on reliable authority, of horses procreating at even a much later period of life. I perfectly well recollect a half-bred entire horse, which had been employed as a hunter until he was 20 years of age, and up to which period he had never covered a mare; after this he was 28 years old, he got a great many foals every season; but it was generally doubted whether his produce had that amount of stamina that they would have had, had their sire been a younger horse. Our correspondents are somewhat inexplicit as to the earliest periods at which foals may be got; and little is

said by them relating to entire horses being put to mares at a very early age, although it is stated that this occurs as early as 2 years old. Mr. F. Chamberlain says, that early sexual intercourse in excess does occasionally produce impotency. Mr. J. S. Merrick believes that it tends to that effect only when carried to excess at an early age. Mr. W. T. Stanley remarks that excess of sexual intercourse at an early age temporarily debilitates the animal, and that in the following season he will have regained his vigour. Mr. Barker observes that 2 year old horses are allowed but few mares during the first season; hence the few cases of impotency arising from early excessive sexual intercourse among them. In bulls, however, it is by no means uncommon for both vigor and development to be arrested, from early and too frequent access to cows. Nearly all our correspondents agree that seminal emissions do take place in the entire horse; and that they are not involuntary, but depend generally upon excitement, and especially from the presence of mares. It must also be allowed that if this act does take place to excess, debility follows, but although such is the case, and in hot climates in particular, it is not so in this country to any injurious extent, so far as my experience goes. Nevertheless, breeders should make it a rule to keep male animals that are intended to be used for the purpose of getting stock as much by themselves as possible, so as to ensure their full vigour when needed. On the question of the influence of fat and exer-

cise inducing impotency, we think our correspondents do not lay sufficient stress. It would appear from them, that thoroughbred horses get only from two to three hours' exercise in the day; and some are only allowed to pace their own loose boxes. Is this exercise enough, we should ask? Is not the state of the cart stallion better, who travels his sixty miles in the week? But is the excessive quantity of fat usually seen on cart stallions desirable? Is it necessary or is it merely for show? May it not be the cause of so many cart mares not being stinted? Cannot statistics be obtained showing that an animal taken from regular, but not too hard labour, and in good working condition, is the most likely to procreate the best foals, and perhaps the greatest number also? These are questions we submit to our readers' consideration. Our correspondents all agree that the number of mares put to horses during the season, averages from forty to seventy; and that from an hour and a half to two hours is the usual time between the acts of copulation. I would add that, on some occasions, I have known as many as three or four mares covered in as many hours. Is this in accordance with physiological laws? May not the large number of weak, leggy, bad constitutioned animals, "weeds," depend upon inattention to some of these causes? And would not a knowledge of this save a man, who puts a valuable mare to a very superior stallion, much chagrin when he finds the produce comparatively good for nothing? This part of

our subject is well worth further investigation; and I should be glad of the opinion of practical men on this point. Another matter having reference to the entire horse, on which our correspondents likewise agree, is that the quantity of mares put to a horse in one season is very large; and that the power of the horse for such large numbers is obtained by giving stimulating food, this may be very well for the owner of the horse, but is it a system to be tolerated by the practical breeder? Ought he not to take steps to ascertain how many mares have been covered by the horse he employs? Surely it must be a short-sighted view of the matter to prefer a "cheap mount." Yet I believe many would say that if low fees are taken the numbers must make up for the low prices paid. Mr. Gibbon says that it is considered desirable to allow only two hours between the first and second act of copulation; but a longer time must elapse between the second and third act, and that horses are very rarely allowed to serve more than three mares in the day, if it is wished to ensure good stock. It would be well if this course were universally adopted.

It appears from the answers we have received, that the profession generally has but little knowledge on the subject of impotency in stallions. Statistics bearing on this subject, if there are any, would be gladly received by us. Our correspondents give us very little information as to the cause of sterility in mares. From the observation of Mr. Chamberlain, we infer that he inclines to

the opinion that an accumulation of fat in the system is unfavorable to their being impregnated, for he says: "the most likely means to ensure the mares being stinted are attention to the condition of the animal, placing her as much as possible in a state of nature, and the removal of all stimulating food." On the same subject Mr. Stanley says: "change of diet, and cooling medicine given previous to the animal being stinted are beneficial." The observations of these gentlemen agree with my opinion, namely, that fat in excess induces sterility in mares; indeed, I believe it to be a very frequent cause of barrenness, still I should be glad to be furnished with some practical information on this subject, and also at what period during the time the mare is at œstrum ought she to have sexual intercourse to ensure her being impregnated? Would it be better to put her to the horse as soon as it is discovered that she has a desire for him, or just as it is passing off, or during the middle of that period? Or are there any particular signs familiar to breeders which point out the proper time for coition, so as to ensure the mare being stinted? In answer to the tenth question, Mr. Chamberlain says: "I believe it is a common law in nature of unlike breeds to be more productive, it is so with the common bred bull as compared with the high bred animal, besides which such a bull is in a much more natural condition for coition, from his not having been exposed to the same artificial mode of living, &c." Many instances are men-

tioned where some peculiarity has been transmitted to the better bred descendants. I have no doubt but this will occasionally be seen, but it is less likely than it was some time back, as the common bull is now better bred than he formerly was. This peculiarity appears rather common in the dog. In answer to the same question Mr. Merrick says it is a fact that high bred cows will frequently conceive to a low bred bull, after having failed to one of pure breed. The experience of his own groom, who has had the management of stallions for fourteen years, is "that he has frequently noticed that well-bred mares, which have been difficult to stint with thoroughbred horses, have bred to an inferior, and subsequently to a thoroughbred stallion; but her stock by the latter has frequently showed traces of inferior blood, not to have been expected from the breed of either the sire or dam." On the subject of preventing barrenness in mares, we are furnished with but few new facts, except that Mr. Barker says, if the mare be put to another description of horse, that it is a practice with some persons to draw blood from her during the act of copulation. But this we believe to be an old practice. Mr. Stevens states that there would be fewer cases of barrenness in mares if they were better fed, and better care were taken of them than is generally done. In answer to our twentieth question, Mr. Gibbon replies that there is no certain rule to guide us as to whether the mare is pregnant or not until she is half, or a little more advanced in

pregnancy, at which time he refers as a test to the usual mode of giving the mare a bucketful of cold water, a few minutes after which the foal may be either seen to struggle, or be felt by placing the hand on the inferior part of the abdomen, a little anterior to the mammary gland. Mr. Chamberlain says, the early symptoms appear to be, cessation of desire for the male, a less irritable state of the system, and a disposition to come fat. The observations of Messrs. Stanley and Merrick are to the same effect, the foal. Mr. Barker, in answer to question five, states that the offspring inherits the good or bad qualities of the sire, in preference to the dam. And in answer to question six, he remarks, "that aged sires get more fillies than colts."

Mr. Chamberlain thinks that constitutional defects are more frequently transmitted from the dam. And in answer to question seven he says, there is a preponderance of females in all domesticated animals; but mares of the cart breed produce more colts than fillies, such, however, he thinks is not the case with thoroughbred stock, which may probably be explained by the "in-and-in system of breeding," or rather a want of crossing with animals of dissimilar character. Other correspondents are of opinion that the dam is frequentlly at fault. I am surprised, however, not to find the attention of breeders directed to these peculiarities, for we believe that according to the age of the parents so will be the vigor and also the sex of the progeny. In speaking of this

I would ask if "weeds" are not produced from some of the above causes? We have lately heard it stated that many of the Irish, and also persons of weak intellect, in public asylums, are the produce of those who have married first cousins.

With reference to the influence that either the sire or dam may have upon the offspring, Mr. Stanley in reply to the fifth question, states, "the future progeny is liable to be influenced by imperfections both in breed and constitutions, and these are mostly propagated by the sire. My inference is mostly derived from what I have frequently seen in my own establishment—having had several stallions which were kept purposely for breeding, and amongst them was 'Cricketer,' who, with few exceptions, was considered one of the soundest horses in existence. The only disease he had was a constitutional defect in one of his eyes. This affection was confined at first, and that for a long time, to the lachrymal apparatus, principally causing a continual flow of tears over the side of the face. The horse was in my possession three or four years, and the eye did become worse, but later in life he became blind. His stock were animals of first rate quality and power; and the only malady they were subject to was ophthalmia. This affection, however, was not of very frequent occurrence. I wish also to mention that I know a thoroughbred horse called "York." He was lame from bone spavius and nearly all his stock were affected in the same way, and became iucurably lame; in fact some were

foaled lame, or became so before they obtained the age of one year." I have already alluded to the subject of "weeds." I shall close this summary with a few additional remarks upon them by Messrs. Stevens, Gibbon and Stanley; Mr. Stevens thinks, that want of proper feeding of the mare is in a great measure the cause of the above description of horse. He also says that cart stallions have often far too many mares put to them, and that at the end of the season they evince very little desire for copulation. I have often heard of its being necessary to give them very stimulating food, and use means to excite them before the act. Therefore, want of energy in the horse may be one of the causes to produce "weeds." Mr. Gibbon says, "animals called weeds, generally inherit their peculiarity of constitution from their parents, but if a foal or yearling is kept with an insufficient supply of food, either in quantity or quality, it will become a weed. I also think they are sometimes produced from sound stock, when the generative organs of the dam, having been in a state of inactivity until advanced in life, do not possess sufficient nervous influence to supply the embryo with nutrition." Mr. Stanley says, "animals termed weeds are solely referable to the bad and injudicious crossing of sires and dams, and not from the quality or quantity of the food or the colt, which has little to do with it."

On the Hereditary Diseases of Horses and Cattle, &c.

Although certain determinate characters and forms, perpetuated by generation, distinguish the several races or breeds of horses and cattle in this and other countries, yet these distinctive marks are not so arbitrarily fixed, but that individuals, in any one of those breeds, may and do differ among themselves, in constitution and temperament, as they are severally affected by varieties of organization, disposing them to different diseases, these predispositions, no less than the varieties of size, form, colour, and other obvious properties, are hereditary and transmissible to offspring; and though the direct proof may not be equal for the two cases, and the effects resulting are of such different importance; yet is it certain that the peculiarities so carried on, from one generation to another, have reference to one common law.

Without entering minutely into the consideration of the cause of such deviations from the primitive or common type of the species, we may remark that certain external circumstances, as food, climate, and domesticity, appear to have had considerable power in modifying animal organization. Possibly the most important influence in this respect is due to the artificial mode of life which some animals lead under the control of man, by which modifications are induced to a

certain extent, and are transmissible to offspring, it is to this influence that we may probably attribute the occasional production of accidental varieties—many instances of which may be cited as examples of this singular phenomenon in the reproduction of the species. Thus the polled breeds of cattle sprang from an individual variety, which was preserved by the Scotch farmers, on the supposition that such formed animals would become more quiet and less apt to gore one another than the native races. The 'Ancon,' or 'Otter' breed of sheep, now established in America, is another striking instance of departure from a common type, a variety that was preserved in consequence of their short otter-like limbs, which prevented them from leaping fences. We have also another singular example in those races of dogs that have a supernumerary toe on the hind feet, with the corresponding tarsal bones—a variety analogous to the one presented by six toed or six fingered families of the human race. Other cases could be adduced. We cannot, however, term such singular varieties as accidental, since there is nothing in the phenomena of nature to which the term accident can well be applied. The characters are doubtless the result of some organic change proper to the animals in which they appeared; and their transmission to their progeny is only the exemplification of a law common to other cases of transmitted characters.

It is generally allowed that congenital varieties of this character tend to become hereditary, but

changes wrought in an animal after birth are not thus transmitted to offspring. This assertion is especially true in respect of deformities and mutilations, the result of accident or of man's caprice. Changes of this kind occurring during the animal's life commonly end with it, and have no obvious influence on its progeny. Had nature wrought otherwise, the mischances of all preceeding ages would have been entailed on us; and cropped dogs and dock-tailed horses would be born ready to our use, but although deformities of this kind are not hereditary, there are certain acquired conditions of the body, the consequence of disease, which are frequently conveyed from parent to offspring. The state of health of either parent, particularly of the mother, at the time when the existence of the offspring commences, has a strong influence in the production of healthy or unhealthy progeny. I shall adduce a great many examples in support of this position in the course of my essay. The applicability of these remarks to the question of hereditary disease is sufficiently obvious. If new characters are produced in domesticated animals, because they have been taken from their primitive conditions, and exposed to the operation of influences unnatural to them, we can have no reason to doubt that deviations of structure, whether in the way of deficiency or of excess, or any other new development, are occasionally produced and transmitted; and with these deviations, certain propensities to, or conditions of morbid action in the parts thus

abnormally organized, generally the offspring is born free from disease, consequently it is not disease itself which is transmitted, but organs or textures of such imperfect kind, that they are liable to be morbidly affected by causes which would produce no effect on limbs or textures soundly or normally developed.

Mr. G. Barker, V. S., Reiyate, relates the case of a mare that was farcied, and, the owner breeding from her, the foal showed symptoms of farcy soon after birth, and died glandered. Veterinarian, vol. 13.

I have heard of a similar instance, where the farcied mare was bred from and the mare survived, but the foal exhibited symptoms of farcy and died. These cases are congenital, but diseases in which the fœtus participated with the mother, owing to their contaminating influence, or their extension throughout her organization, are not, properly speaking, hereditary. The following case is more to the purpose, related by an old friend of mine, who lived within eight miles of me, in Devonshire, the late Mr. Robert Reed, Crediton, V. S.—"I have seen," he says, "a foal born blind, having a lenticular cataract in each eye, from the dam having been put to a stallion with a cataract in each eye, the result of a constitutional inflammation." Regarding the subject of hereditary diseases in a general way, we shall have to consider:—first, those which are induced by peculiarity of conformation, both in the external and internal parts of

the body. Second, those in the transmission of which the condition of the blood may be supposed to be partly or wholly concerned.

In treating the subject under these two heads, we shall follow the classification as closely as possible, but, on account of the close and intimate connexion existing between the solids and the fluid portions of the body, in growth, function, and change, there will be a difficulty experienced in some instances, in separating them in the inquiry. My first example will afford an instance of the kind. First. (*a.*) Spavin and other ossific enlargements, the predisposition to which may be either constitutional or local. They are composed of the earthly matters of bone, chiefly invading the tissues low in the scale of organization, such as cartilage and fibro-cartilaginous substances; injuring the structure and functions of the parts, by rendering them rigid and inelastic, and causing partial or complete lameness, depending on the situation and the extent of the deposition.

It is perfectly well ascertained that the progeny of some horses inherit a constitutional tendency to splints, spavins, ring bone, and other bony deposits, without exhibiting any peculiar conformation of limbs or joints to account for it. These are instances of an ossific diathesis, transmitted from parent to offspring, but, on the other hand, this hereditary predisposition more commonly depends on faulty or peculiar conformation. Thus horses most disposed to spavins are those possess-

ing short pointed hocks, deficient in width and breadth below, and disproportionately small, compared with the upper portion of the joint. Those most disposed to ring bone are horses with upright pasterns and high action; and those most liable to ossified cartilages are the heavy draught breeds; so much so that it is not an uncommon case to find the cartilages of the feet of horses of this character changed into bone at four and five years old. The reason of this is evident enough: concussion is easily produced in the joints of the characters of horses described; inflammation of a slow chronic kind follows as a natural consequence, and osseous effusion is the result. There is no difficulty in establishing the hereditary character of those diseases. Taking spavin as an example, I have numerous and unquestionable cases to produce. Some ten or a dozen years since, a spavined thoroughbred stallion, Logic, served mares in the neighborhood of Exeter, and in a few years afterwards it was really astonishing to see the number of his stock that were similarly diseased. One striking circumstance connected with this horse is much to the purpose. A half-bred mare, one of his stock, exhibited spavins at four years old, and becoming unfit for fast work, was kept for breeding purposes and occasional work on the farm. Two of this mare's stock also exhibited spavins in a short time after the breaking. There is a curious case recorded in the Veterinarian, by Mr. Percivall, of a thoroughbred horse called "Dominie Sampson," that

had run very successfully on the English turf, and, although fired in both hocks, was inconsiderately purchased for the East India Company, and sent out as a covering stallion to the stud at Buxar, where for four years he had forty mares annually, and the whole of which generally proved with foal, but were affected either with curbs or spavins, and only one of his stock was passed into the cavalry; consequently he was discarded from the stud. (*b.*) Curbs are frequently found in horses exhibiting the character of hock described in the last example, and are generally caused by injury of the annular ligament, from over exertion, producing swelling and inflammation about three inches below the point of the hock formed by the os calcis. The peculiar form of this bone appears to be connected with the cause of the disease. Its chief purpose is to act as a lever for the action of very powerful muscles, the tendons of which are inserted into its extremity, and in proportion to the projection of this bone will the muscular energy be increased by which the joint is moved. On this account, its length is a matter of considerable importance. It is supposed also to assist indirectly in supporting the superincumbent weight with the other bones of the hock, and materially assists in preserving these parts from the effects of concussion. But when the os calcis is short, forming a short pointed hock, the leverage or mechanical power is injuriously diminished, leaving too much for the other parts of the joint to perform, and con-

cussion is the common consequence, followed by inflammation, and lameness, sometimes connected with curbs, at other times spavins or thorough pins; and it is not an uncommon case to see all three of these diseases in the hock at one time. There are other formed hocks, which are even more disposed to curbs than the one just mentioned; such are the "sickle-hock" or "cow-hock." I can scarcely name any disease of the horse which affords stronger evidence of a hereditary tendency derived from the peculiarity of structure than the one I have been considering. I have also some interesting examples of disease in the feet arising from faulty and peculiar conformation.

(*c*) Diseases of the feet.—Most persons acquainted with the feet of horses will recognise their strong tendency to disease, arising from faulty formation. Sometimes the hoofs are disproportioned to the frame—they may be too small, without sufficient base to support the superincumbent weight—rendering the footing insecure, or too large and unweildy, rendering the action slow and awkward. At other times, the crust of the hoof is naturally weak, arising from a faulty secretion of horn. Such hoofs are generally uneven, indented, and wrinkled, and have invariably flattened soles, with a disposition to become pumiced. Again, I occasionally find the crust morbidly dry and brittle, arising from the absence of that peculiar tough and elastic horny material which consolidates and binds, in

perfectly formed hoofs, the longitudinal fibres of the crust together. Feet of this character are particularly disposed to sand cracks. All these defects I have been describing in horses' feet are found to exist, not only in different, but in the same breed, and are most certainly propagated in breeding.

The navicular disease is another striking example of hereditary disease, to which horses are liable, arising from peculiarity of structure. Those most disposed to it have slender bodies, low action, strong upright hoofs, narrow heels, and great concavity of soles. Lameness is soon produced in horses of this description, when the hereditary tendency exists, from exciting agents of various kinds, such as exposure to heated, fermented litter, imperfect shoeing, fast roadwork, whilst animals free from this hereditary proclivity are capable of withstanding all these influences.

The contraction usually seen in diseased feet of this kind is perhaps more commonly the consequence than the cause of the lameness; but sometimes it may act as a predisposing agent—the former in cases when inflammation precedes the contraction, the latter when a manifest alteration in the form of the foot precedes the lameness. Hence, breeders should at all times look with very considerable suspicion on a stallion exhibiting narrow, contracted, upright hoofs; for although we may occasionally observe old horses having contracted feet and otherwise out of shape, performing their work without lameness, yet such

horses should be invariably avoided in breeding.

Mr. Thomas Surner, V. S., Croydon, related an interesting case respecting the hereditary nature of the navicular disease, at a meeting of the Veterinary Medical Association, well worth mentioning here—that of a colt bred by himself, which became lame from this disease at four years old. Both the sire and dam of the colt had narrow, contracted feet; and the mare becoming unfitted for work, was destroyed, on dissecting the foot which exhibited the greatest amount of disease, he discovered a hole in the navicular bone; and, strange as it may appear, the colt's lameness existed in the corresponding foot; and, what appears still more curious, the dam had a rat-tail, and the colt had a fac simile of it.

In the examples given we have positive evidence of diseased action arising from peculiarity of structure, and transmissible by descent. The breeder may learn a useful lesson from them—that in selecting horses to breed from, it is not enough to direct his attention to pedigree chiefly, but he should be also guided in his judgment by external conformation. The animal machine may be put in motion by the noblest blood, but unless every bone has its just proportion, every muscle its proper pulley, and every lever its due length and arrangement, the motion can never be accurate, vigorous, and durable. I will next direct your attention to some important diseases of the internal parts of the body, depending on something defective or ill-balanced in the organiza-

tion. On the first view it might appear that such deviations were less extensive than those of outward conformation; but there is reason to believe that they occur far more frequently than is generally imagined. Dr. Holland says, "that there is scarcely any organ of importance which does not afford evidence of diseased actions derived from structure, and transmissible by descent. On looking to the textures more widely diffused through the body—as the different vascular systems, the nerves, &c. We have every reason to suppose, though the proof be less direct, that they are subject to hereditary variations of structure, not merely in detached parts of each system, but throughout those minute branches and terminations where the most important functions of the body, both animal and vital, must be presumed to take place." The diseases of the respiratory organs will afford some interesting examples, both in horses and cattle.

(*d*) Roaring.—So called from a peculiar sound uttered by the horse when his respiratory actions are violently excited. Mechanical injury to the larnyx, and the windpipe just beneath it arising from improper use of the bearing rein—or tight reining, so commonly practised in the breaking of young horses—are frequent causes; sometimes this disease makes its appearance independent of any of those uncalled for mischievous acts, such as the result of catarrh, or some sub-acute inflammatory affection, causing a thickening of the lining membrane of the upper portion of the

windpipe; and, at other times, roaring is produced without any apparent cause whatever; in which case the disease is attributed to atrophy of the muscles of the larnyx. Without further considering the causes of roaring, this fact is clear and evident enough, that is, hereditary character is very frequently exhibited. Instances are numerous everywhere of stallions affected in this manner, causing the same in their offspring.

Mr. Simonds, in his lecture to the members of the Royal Agricultural Society at York, referred to the circumstance of the larger proportion of roarers found amongst the Yorkshire horses, which he attributed to hereditary predisposition; and we had an opportunity, in consequence of an official appointment as judge of the horses at that meeting, of proving the truth of this assertion.

(*e*) Broken wind is another example of diseased action derived from abnormal structure, and transmissible by descent. This is a disease perhaps not generally considered as having an hereditary origin. It is caused by disordered functions of the lungs, and is common to horses of sluggish temperaments and slow action; also to carriage and hackney horses, whose work is irregular, and, from mismanagement; their exercise not sufficiently attended to. On the contrary, it is seldom or never seen in the racing stable, and rarely in the hunting stable, where the work or exercise, and feeding department are properly conducted. Why is this? Because the condition necessary to preserve the healthy functions of the

lungs are fulfilled in the latter instance, and not in the former. One of the chief conditions necessary to this end is exercise. It is this only which will promote perfectly free expansion of the chest, so that the air may have free and frequent access to the air-cells; by which not only the muscular functions of the lungs but other parts of the body, are alike preserved in healthy activity. In the absence of this, the textures of the lungs become flaccid and weak, and lose their healthy resiliency and contractile power. Under these conditions, in fact, they become gradually atrophied, which is the essence of the disease known as "broken wind." The healthy vigour of all the functions of the body is best maintained by their equal and moderate exercise. The muscular function, and with it the circulation of the blood, is the first to suffer from the want of it, hence, first sluggish movements and ultimately weakness of the heart and other muscles—causing deficient and disordered secretions, general plethora, over nourishment of adipose textures, and wasting of muscles; and various evil consequences of these morbid conditions may result from these causes, when long in operation —such as biliary derangement, indigestion, and flatulency. The emphysematous state of the lungs, usually observed in dissecting broken-winded animals, is undoubtedly induced from disordered secretion, and not by any mechanical rupture of the air-cells, as is commonly imagined. In the view we have taken of this disease, called

"broken wind," the organs of respiration closely resemble the muscles and other organised parts of the body. They were made to be used, and if left in partial inactivity their natural elasticity and power, or tone, are unavoidably impaired. But the mischief does not stop here. It is a very common practice with farmers to breed from broken-winded mares, and the progeny, in a great many instances, inherit a tendency to the disease, because their lungs are never normally developed like those of sound, active animals. The foregoing examples are mostly diseases of structure; we will now consider others where the blood may be considered as taking a part in hereditary transmission.

Second (*a*) Tubercular phthisis, or consumption in cattle, will afford an interesting case of this sort; and although presumably a structural disease, yet it is one that is evidently produced from a vitiated state of the blood, arising either from defective food or from living in a contaminated atmosphere. From either of these causes the blood is rendered unfit for adequate nutrition, and the lungs become diseased from the deposition of tubercles on its surface in consequence. These deposits are much more commonly produced in cattle than is generally imagined. During the early periods of life the vital principle of stock of this description is but too frequently taxed by resistance required to be made against cold, wet, and insufficient food, causing malnutrition. The organic materials of the body are

not persistent, but are more or less prone to decay, becoming effete or worn out in a limited period of time. But, in the healthy body, there is a reparatory process continually countervailing this decay, by the deposition of new materials whose vital affinities are energetic, and able to maintain the integrity of the textures. This renewal depends on the supply of healthy chyle to the living structures, and, if it be defective in quantity or quality, mal-nutrition takes place, and the fibrin of the blood, instead of acting as a plastic material for renewing the worn-out parts, becomes a source of tubercles, and the lungs speedily suffer, and that oftentimes to a considerable extent. Breeders of cattle may rest assured that the offspring of a consumptive cow is almost certain to inherit a disposition to the disease, and, when this is the case, it is quickly induced by any cause that may reduce the healthy vigour of the system, such as exposure to cold and wet, causing congestions and chronic inflammations, or, as previously stated, from being insufficiently fed. It is a question, too, well worth considering, whether this tuberculous predisposition may not be frequently induced in embryo, from the neglect of the necessary conditions required for the healthy support of the cow. Sir James Clark, has directed the attention of the public to this circumstance. He says "that a state of impaired health of the mother, whether constitutional or acquired, and particularly if caused by imperfect digestion and assimilation, is as pro-

ductive of a tendency to scrofula and consumption in the children as if it had descended by hereditary transmission."

(*b*) The tubercular disease in horses is not near so common as in cattle. In young horses it is sometimes induced by imperfect and insufficient food, rapid growth, and exposure to the vicissitudes of the weather. The mesenteric glands and mucous follicles of the small intestines are most generally affected in these cases—becoming enlarged and filled with purulent and tubercular matters—but in old horses the lungs are the parts chiefly attacked, the symptoms assuming a glanderous character, such as nasal discharge, short cough, defective appetite, and general loss of condition.

The next example is a disease of a scrofulous character, and, like unto the previous one, is evidently produced from a vitiated state of the blood.

(*c*) Scirrhous tumours in cattle. These tumours are generally seen in working oxen and bulls, old or full grown. They make their appearance without any apparent pain or constitutional disturbance; at first confined to the thyroid glands, and finally attack the sub-maxillary and parotid. The disease is known well in the county of Devon, where I have resided for the last thirty-five years, to the farmers in the west of England, under the name of choke-ill, as, in the latter stages of the complaint, there is great difficulty of swallowing experienced, arising from

the roots of the tongue and the throat becoming affected. When these symptoms appear, the animal quickly dies. A section of one of these tumours displays several abscesses, containing purulent and sometimes fœtid matter, enclosed in fibro-cartilaginous cysts, and which never discharge themselves like unto healthy phlegmonous abscesses. My case-book furnishes me with the history of many instances of the disease, proving unquestionably its hereditary character. The last two examples of hereditary disease are of a scrofulous character, and are recognised as constitutional disorders, continued from one generation to another, through the medium of the blood. However difficult it may be to imagine or conceive a fluid like the blood, ever in motion and change, being capable of hereditary taint, yet is it not really more difficult to understand than a character or peculiarity conveyed by descent to any part of the solids of the body! Such is Dr. Hollands opinion: "the blood," he says, "has vitality in every sense in which we can assign it to the solids, of the instances given of the blood concerned in transmitting hereditary taint, it will be remarked that they are perfectly in accordance with the transmission of hereditary likeness, occasionally observed in breeding, and which is also even more difficult to conceive or imagine. I allude to the curious statement lately brought forward by Mr. James McGillavry, of Huntly, V. S.—That when a pure animal of any breed has been pregnant to an animal of a different

breed, such pregnant animal is a cross ever after, the purity of her blood being contaminated in consequence of her connection with the foreign animal. The two following cases may serve as examples: "a pure Aberdeenshire heifer was served with a pure Teeswater bull, by which she had a first cross calf. The following season the same cow was served with a pure Aberdeenshire bull; the produce was a cross calf, which, when two years old, had short horns, the parents being both polled." Again, "a pure Aberdeenshire cow was served, in 1845, with a cross bull, that is to say, an animal produced between a first-cross cow and a pure Teeswater bull. To this bull she had a cross calf. Next season she was served with a pure Aberdeenshire bull; the produce was quite a cross in shape and colour." The following striking example occurred in Devonshire, a half bred mare strayed from the field and was served by a donkey: the produce was a mule. The following year the mare was taken more care of, and was served by a half bred horse, yet the progeny bore a strong likeness to the previous mule, in the reproduction of the upright mane, marks, and even colour and form. Is this not a striking lesson to breeders who are in the habit of putting their heifers the first time to any mongrel bull, not being aware that the purity of her second stock would be contaminated by the first connection! The explanation offered by Mr. McGillivray of the phenomenon is ingenious, and consistent with acknowledged

facts in physiology. "By the formation of the after-birth (placenta) a connection is established between the mother and the living creature (fœtus) in her womb, through which the latter is continually drawing supplies from the mother's blood, for its growth and maintenance. But there are good grounds for believing that, through the same channel, the mother is as constantly, though, doubtless, in much less quantity, abstracting materials from the blood of the fœtus. Now, is it at all unreasonable to suppose that the materials in question may be charged with (or have inherent in them) the constitutional qualities of the fœtus, and that, passing into the body of the mother, and mixing there with the general mass of her blood, they may impart those qualities to her system." "The qualities referred to must in part be derived by the fœtus from its male parent, and be to that extent endentical with his. The distinctive peculiarities, therefore, of that parent may thus come to be engrafted on the mother, or to attach in some way to her system; and if so, what more likely than that they should be communicated by her to any offspring she may afterwards have by other males! and, under some views, it is the portion of the animal frame which is especially so endowed. Its first appearance in the area vasculosa of the germinal membrane of the embryo is prior to the existence of those very organs which, after birth, chiefly minister fresh materials to it; and though undergoing constant change, it has this in com-

mon with the animal solids, and with those equally which are most frequently the subjects of hereditary affection."

My next example involves a similar question, and is an instance of a disease that can scarcely be conceived in any other manner than as circulating in the blood, and conveyed to different parts or organs in the body.

(*d*) Rheumatism in cattle.—There is much that is curious in the tendency to rheumatic affections so frequently observed in the ligaments and synovial membranes of the joints of cattle, and likewise in the fascia or cellular coat of the muscles. This disease is attended by stiffness and inability to move, pain on pressure, and more or less febrile symptoms. Sometimes it attacks one or two joints, and occasionally shifts its action to the others. This tendency of the disease to shift from one part to another is evidence of constitutional affection, and dependent on temperament and state of the circulating fluids. Among the causes which predispose to rheumatism must be placed an hereditary tendency and temperament of the animal, for, although we find it prevalent in cold, marshy districts, in exposed places, and during the spring and autumn months, when there is the greatest vicissitude of heat and cold. Yet why the same agents should produce rheumatism in one case, bronchitis in another, pleurisy in a third, and dysentery in a fourth, and so on, can only be explained by supposing that each individual has some particular organ or organs

which are more prone to disease than other parts of its organisation.

Mr. Dupuy relates some cases in proofs of glanders being hereditary. "A mare," he says, "on dissection, exhibited every appearance of glanders; her filly who resembled her in form as well as her vicious propensities, died glandered at six years old. A second and a third mare and their foals presented the same fatal proof that glanders is hereditary." It must be obvious that all causes, as well as the effects they produce, must have an intimate relation to the condition of the living frame, and that those which might be quite inefficient on one animal will be more powerfully active on another, owing to the state of vital energy at the time. The effects produced by various animal and vegetable exhalations on different horses fully illustrate this position, producing glanders in some, farcy in others, and grease and opthalmia in very many.

(*e*) Chronic dysentery.—There appears a strong tendency in cattle to take on this disease. A scanty allowance, with exposure to cold or wet, or anything else that may disturb the balance of the circulation, will induce it when the hereditary predisposition exists.

Mr. Youatt was of opinion that the practice of breeding from the nearest affinities induced this disease, and cites as an example that of the dishley long-horned breed of cattle, which were notoriously bred in this manner, not only by Bakewell, the originator of the breed, but also by his

successors, and they were so highly disposed to dysentery that it proved the element of their destruction. That the breeding too far, and too incautiously "in-and-in," will produce a weakness of constitution that predisposes to dysentery, is very probable. A delicacy of temperament and form, with a tendency to arrive quickly to maturity of bone and muscle, is attained by breeding in this manner; but with these valuable properties a weakness of constitution is engendered that renders the cattle less hardy, and less capable of withstanding irregularities of living, and exposure to vicissitudes of weather. A question presents itself here with reference to "in-and-in" breeding, that, in such instances, whatever hereditary tendency to disease might exist, is certain to be developed in the progeny in its most marked and aggravated forms; and on the same principle will cross breeding tend to reduce, or, may be, remove the disposition altogether.

The next examples of hereditary tendency to disease, and the last we shall adduce, are those connected with the eyes of horses and cattle, they also, very probably, depend on some peculiar state of the blood, involving the same question as gout in the human subject, though perhaps more dependent on occasional exciting causes from without.

(*f*) Constitutional opthalmia in horses. A disease of a peculiar inflammatory character, showing itself at intervals, and especially at a certain period of life, generally from three to five years

old. When the hereditary proclivity exists, it is easily excited by miasms arising from crowded, dirty, and imperfectly ventilated stables. My case-book and memory furnish me with some scores of cases in proof of this. One of these is connected with a horse called "Katerfelto," that served mares in the county of Devon some thirty years since. He was a favorite stallion with the farmers, and got a very extensive, and, with the exception of the strong constitutional tendency to specific opthalmia, an excellent stock. Notwithstanding so many years have elapsed, yet the disease could be accurately traced from him to his descendants, handed down through the female line, some ten years since.

(*g*) Specific opthalmia in cattle is not so common a disease as with the horse, but it has the same periodical character, and will disappear and return until it reaches its natural termination,—blindness. The constitutional nature of the disease being once correctly ascertained, the farmers usually fatten the animal for the butcher, or at least they should do so, as its hereditary character is as certain as it is in the horse.

(*h*) Gutta serena, commonly known as the "glass eye," is a disease characterised by a preternaturally dilated and motionless pupil, the consequence of palsy of the optic nerve, or of the retina. It is fortunately a disease of rare occurrence, and is supposed to be produced by determination of blood to the head. But cases sometimes occur, in which there is no discernible cere-

bral affection. A case of this kind happened to a horse of our own, and on making enquiries sometime after, of the breeder, the dam was acknowledged to be similarly affected.

Mr. Baker, V. S., Reiyate, alludes to a case of a foal which was born with gutta serena, and on making the necessary inquiries, the mare's eyes were found perfect, but the sire was proved to be thus diseased; and what was still more worthy of remark, not one of his colts escaped imperfect vision.

Connected with the subject of constitutional ophthalmia, instances sometimes occur where the disease has been lost in one generation and makes its appearance in another. This was remarkably so in the case just recorded of the "Katerfelto" stock. The gout in the human subject will at once occur as a familiar example of this singular variety in the general law of the perpetuation of the species. The breeder sometimes meets with analogous cases in the striking and strongly-marked features of an animal being lost in one generation, and re-appearing in the second or third. Connected with this singular anomaly in another variety observed in the transmission of disease—that of a number of the offspring being affected in common with some particular disease, of which there has been no certain instance on the side of either parent. Instances of this kind can be adduced with respect to curbs and spavins.

A thoroughbred horse, "Royal William," served mares in Devon and Cornwall for some

five or six years. He was a large, powerful horse for a thoroughbred, and was perfectly free from curbs. I have examined more than fifty of his stock, and believe that thirty five per cent had curbs, varying from three years old and upwards This horse, getting out of repute in consequence, was sent to Australia, and I understand that there, as in England, he got a curby race. Mr. Cartledge, V. S., stated, at a meeting of the Veterinary Medical Association, a short time since, that a thoroughbred stallion, called "Fifty-three" begat foals in his locality, and of these no less than twenty-six became afflicted with curbs before they were twelve months old, and yet this horse had no symptom of the disease. At the same meeting, Mr. Varnell, V. S., stated that an entire horse, called "Monarch," had served mares in the county of Norfolk for some years, and on his colts being broken, some at three and others at four years old, the majority were affected with spavins, splints, and ring-bones. Yet he himself was entirely free from any of these diseases. These curious exceptions to the law by which hereditary diseases are supposed to be governed, may be referred to the condition last mentioned, of the revival of a hereditary likeness absent in one or more generations, and familiarly known to breeders under the term "breeding back." The explanation may not be considered a satisfactory one, for it must be confessed that we have but very obscure notions of some of the laws which regulate variation in animals.

That such laws do exist appears highly probable from the numerous instances of the constant recurrence of similar phenomena under given circumstances, which seem to preclude their dependence upon mere accident, and the most striking one is the law which governs the extent to which variation is allowed in the animal economy. There appears to be a limit beyond which change or variety cannot be induced, the original type of the species being ever present, and in constant opposition to their continued progress. This is particularly observed in instances where great refinement in breeding is practised. When the stock has been got up to what is commonly considered the highest perfection, a tendency to degenerate, or return to the original standard, is sometimes observed, and the greatest difficulty is experienced in combatting against this inherent property. Many a breeder can certify to this, that the nearer he approaches perfection in breeding, the greater is the danger of retrograding. But that which is considered perfection with reference to man, such as early ripeness of bone and muscle, with disposition to acquire fat, qualities which eminently characterise our high-bred flocks and herds are, after all, but a state of degradation with reference to nature, since these extraordinary characteristics could never arise or be perpetuated in a wild state under any imaginable combination of accidents.

It will be unnecessary to point out to the agriculturist the important practical relations which

the subject of hereditary disease bears to his pursuits, it being one that cannot fail to enter as an element in his estimate of the purity and value of an animal's breed, and to form an object of special regard in the breeding of stock. It will prove to him, also, that breeding is not so dependent entirely on chance as many persons believe. Events may, and doubtless will, arise to baffle human foresight; but even these will serve as beacons for future guidance, if but fairly considered and understood. Discrepancies of this character are but too commonly set down as the caprice of nature, which may oftentimes be easily accounted for, if such persons will take the trouble to search and examine for themselves. As a golden rule in breeding, the old Yorkshire adage "that like produces like," may be safely acted on at all times, and should never be lost sight of by the breeder.