Lessons in Horse Judging & the Summering of Hunters

FEARNLEY

R. H. Johnston

LESSONS IN

HORSE JUDGING

WITH INSTRUCTIONS FOR

THE SUMMERING OF HUNTERS.

BY WILLIAM FEARNLEY,

FORMERLY PRINCIPAL OF AND LECTURER ON VETERINARY SURGERY AT THE EDINBURGH VETERINARY COLLEGE.
LATE EXAMINER ON ANATOMY TO THE HIGHLAND AND AGRICULTURAL SOCIETY.

AUTHOR OF
"*Lectures on the Examination of Horses as to Soundness.*"

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PREFACE

THE author has endeavoured in the following pages to place on a rational basis a subject that has hitherto been taught dogmatically, if indeed it can be truly said to have ever been taught at all.

The vast wealth in horse flesh, so materially affected by selection of breeding stock, that is invested in the civilized world, is the author's excuse for bringing out this little work.

In the case of the domesticated animals, man's protective interference entirely puts aside the great natural law, the survival of the fittest, which obtains with such salutary effects among non-domesticated animals. Were all the horses of the civilized world gathered into a field, and this field placed side by side with one containing all the antelopes of South Africa, the great law we have mentioned would be most strikingly demonstrated; one field would exhibit the perfect, the halt and the blind, a medley of beauty, and wretched deformity; whilst the other would show only grace, elegance and excess of life.

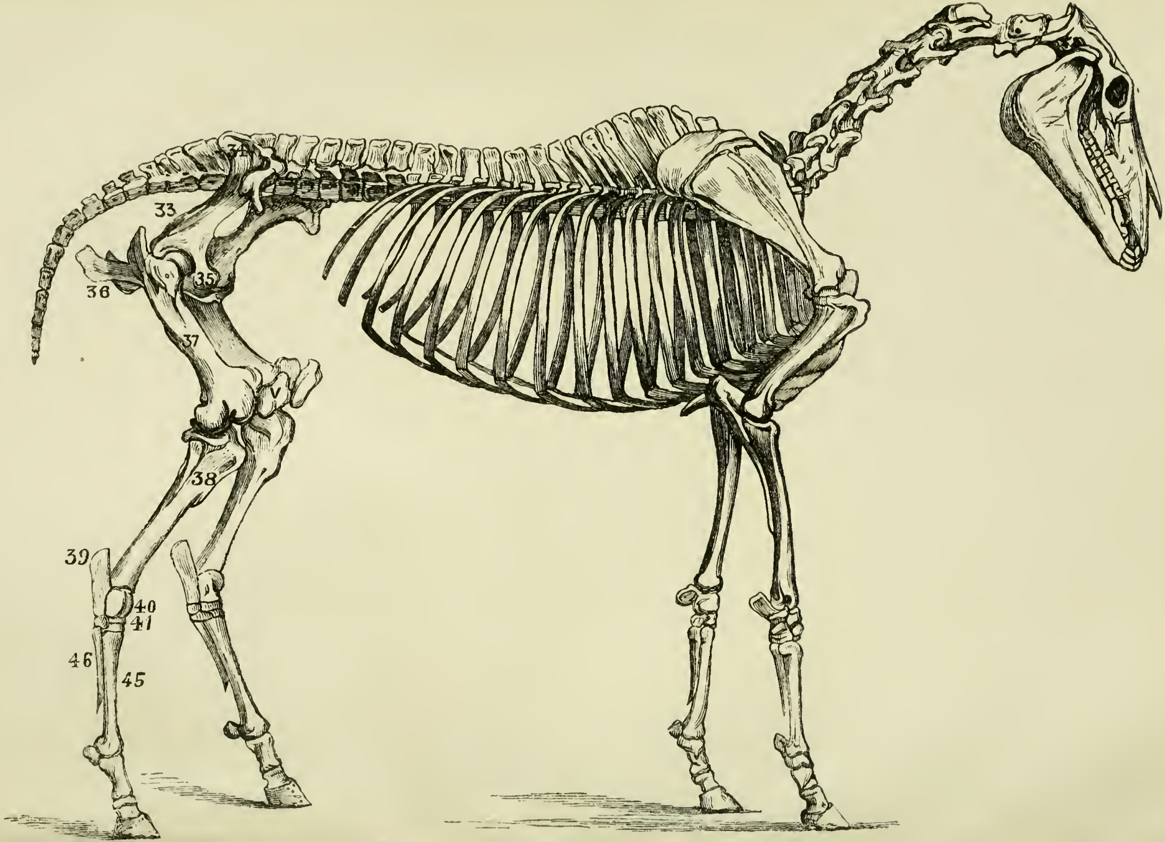
The author ventures to assert that our Government would be doing great service to the nation by taking under its entire control the selection of breeding stock, at least in the case of horse flesh. The sires should all belong to the nation, the fees regulated, and the dams accepted or rejected at the discretion of responsible persons placed between the would-be breeder and the nation. Much has been effected by exhibitions and prizes, but this method holds much the same relation to the one named that chance holds to certainty. At present, the breeding of racing stock only approaches the great law of survival of the fittest, much care being taken to register results, and the representatives of best results are set apart to reproduce their like. A more perfect combination of scientific and logical method than is followed in the reproduction of racing stock does not obtain in any physicist's laboratory. With no other class of horse is this method applicable; hence the necessity of judging by other and less exact methods, and therefore the necessity of some such way as has been indicated.

Lastly, it is desirable here to point out that the book is not written with any intention of standing in place of the *thinking out* process of the learner, but is more as a guide *to* the lines along which thought must be directed. By using it as a guide, and *thinking out* the subject for himself, the author believes that any one of intelligence may in a very few months, by observation and diligence, become a scientific judge of a horse.

The author craves indulgence as the work is entirely original.

London, March, 1879.

CONTENTS.



34
33
36
35
37
38
39
40
41
46
45

EXPLANATION OF SKELETON.

VERTEBRÆ.—The bones forming the neck and tail are seen to be without upper processes or spines. The remainder have spines. Those of the back proper having the *longest* spines especially at the forward part known as the *withers*.

FORE EXTREMITY.—This is explained at Fig. 8.

HIND EXTREMITY.—33, 34, 35, 36 is the Illo-ischium. 37. Femur. 38. Tibia, with the Fibula at the top of it and behind it. 39. Lever bone of hock, corresponding to the human heel, and called the *os calcis*. 40. The Gliding Bone, called *astragalus*, with its two large gliding surfaces well seen in the right hind leg. 41. Buffer bone of hock. 45. Metatarsal bone with small metatarsals (46) immediately behind it. The remaining bones are the same as those of the fore leg.

LESSONS IN HORSE JUDGING.

LESSON I.

INTRODUCTION.

1.—In the following pages it will be attempted to place a subject which has hitherto been largely conducted empirically on a scientific basis.

2.—Horses are living machines like ourselves, and have many things in common with not-living machines which obey certain well-known physical as well as physiological laws.

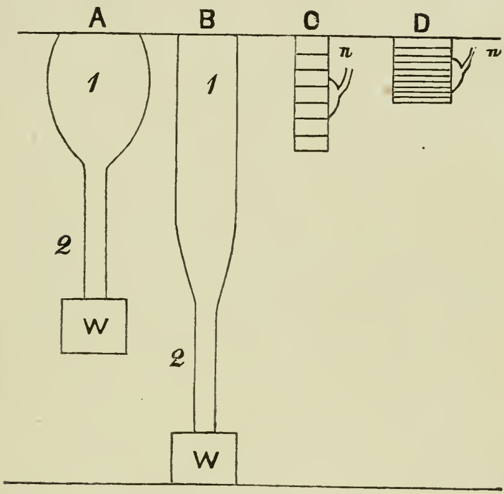
3.—Their mode of progression is by a system of levers, sometimes of perfect construction and advantageously disposed, but more often of imperfect construction and placed at a disadvantage.

4.—In order that the general student may follow us in our further remarks it will be absolutely necessary for us to explain briefly the construction of these living levers which are composed of two materials in every case, namely; an *active* material and several *passive* materials.

5.—The active materials are the so called muscles of the body which we popularly call flesh or 'lean' meat. These muscles, which are attached to the levers of the body, and move them, in doing so always act in one and the same way—namely, by alternately lengthening and shortening. Of these two movements, one is *active*, the other *passive*. It is the *active* movement, that of *shortening*, which does the work. After a muscle has shortened, or, as it is termed, *contracted*, it allows other forces to pull it out or lengthen it and it *passively* submits to being so lengthened.

6.—All muscles are made up of countless bundles, and these bundles are made up of fibres. These fibres being about the same size in all cases, it follows that the more of them the stronger will be the muscle, hence the larger the muscle the stronger. A muscle fibre (See Fig. 1. *C D*) is made up of a number of squares placed one on the other as you would place a pile of dice. These squares, on being stimulated, change their shape, as seen in the diagram. The power of changing their shape is called *muscular irritability*, and resides somehow or other in the muscle itself, or in other words every fibre has *irritability*. This *irritability* is called forth when a stimulant is applied. Various stimulants will call it forth. If you see an animal that is newly killed and which has its skin removed, you see the flesh twitch or quiver in various parts. This is the contraction or twitching here and there

FIG. 1.



of the muscles, whose *irritability* is affected by the cold air, the cold air acting as a stimulant. If you now pinch one of the muscles, or prick it with a pin, it will quiver or contract. The same would occur if you applied galvanism to it.

The natural stimulants of the muscle are the *nerves* (Fig. 1. *n n*) the little white cords which you see running in various directions among the muscles or flesh and which come from the brain and the spinal cord. If you had to apply a galvanic battery to a muscle, before long you would exhaust all its *irritability*, that is, in time it would cease to *contract*, showing that there is only a certain amount of *irritability* in the muscle. If all the muscles of the body contract at the same time, the whole body is perfectly rigid or stiff, a thing we never see in health, but which we see in a modified state after death, and which is called *rigor mortis.* This general stiffness, or *rigor mortis*, comes on as the body cools : the cold acting as a stimulant as we have before seen. In a few hours or days the general stiffness disappears and leaves the body quite flaccid, that is, the cold has exhausted all the muscular *irritability.* In animals that are hunted to death, such as foxes, that are killed after being chased and able to run no further, or whose muscles have lost their *irritability* or power of further contracting, this *rigor mortis*, or stiffness of the body after death, never takes place. So it is with animals who die after long and exhausting illnesses, the stiffness after death either never occurs or occurs so slightly as hardly to be observed. Animals killed by lightning are also never stiff after death. The lightning being so powerful a stimulant as to exhaust the *irritability* of the muscles instantly.

7.—This irritability of muscle can be stored up in vast quantities when the muscle is in what is termed good *tone.* When we speak of a horse, a hunter for example, being *in condition*, we mean that his muscles are in good *tone*, or in other words, that his muscles can lay in large quantities of *irritability* which takes hours of hard toil to exhaust. The process by which the muscles are brought to ' tone' is called 'conditioning.' When large quantities of this *irritability* have been stored, the first expenditure of it is intensely pleasurable, and this pleasurable excitment, unrestrained, which it often is on first coming out of the stable, is called 'freshness.' Shortly, when some of the irritability or freshness has gone off, further expenditure of *irritability* causes neither pleasure nor pain, but indifference, and the horse is said to 'quieten down.' If the exercise or work be carried to an extreme, then, as the muscular *irritability* is vanishing, pain in the muscles comes on which is nature's warning to stop the machine, and lay in another store of *irritability*.

8.—The part of the muscle which contracts is its red part, called its *belly*, (Fig. 1. 1 1) and the hard white glistening continuation of the *belly* is called the tendon (Fig. 1. 2 2). The *belly* of the muscle is usually attached to the fixed part, while the tendon is attached to the part to be moved. If, however, the part otherwise to be moved is fixed, and the muscle contracts, then the part to which the belly of the muscle is attached has to move. When the tendon is drawn towards the belly of the muscle and the movements again and again repeated, the parts would become heated by friction were it not that this is provided against. Friction is prevented by the tendon being surrounded by a *sheath*, containing a lubricating material called 'joint oil' or technically, 'synovia.' This 'joint oil' or 'synovia' is generated by a membrane lining the 'sheath,' and which gets the name of 'synovial membrane,' because it produces the synovia.

Some muscles do not terminate in rope-shaped tendons which have to 'play' through lubricated sheaths, but end in expanded sheet-like tendons which need no lubricating material. We shall find that the muscles of the face are of the latter description, and have their sheet like tendons closely connected to the skin over the lips. This is well seen in ourselves in laughing. The *bellies* of the muscles forming our cheeks contract and of course swell out (Fig. 1. *A*), while their tendons are attached closely to the skin of the lips, especially the upper lip, so that in laughing the cheeks bulge out and the lips tighten and drag backwards.

9.—The contraction of a muscle is very limited, so that the tendon moves a very little distance in its sheath.

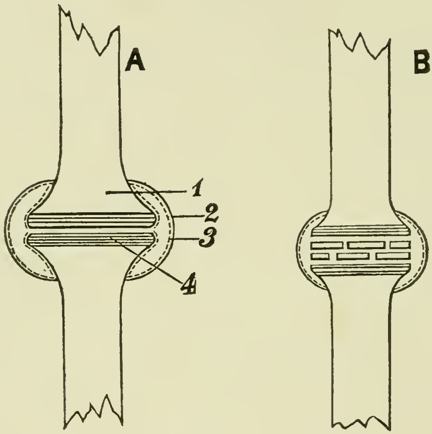
So much for the *active* part of the lever, the remaining parts are made up of *passive* agents in the form of bones and joints.

10.—Bones are of three varieties, named from their shape; long, flat, and irregular.

The long bones are largely concerned in forming the levers; as the fore and hind limbs, which are mainly composed of them. The flat bones, for the most part, make up the face and head; the shoulder blade is also a flat bone. The irregular bones make up the 'back bone,' called the 'vertebral column' which extends from the head to the tip of the tail. The bones making up the 'back bone' are very numerous, being seven in number for the neck, eighteen for the back, five or six for the loins, five for the croup, and from ten to twenty for the tail. With the exception of those forming the croup, which are stuck together and immoveable one on the other, the remainder of the bones forming this long column are slightly moveable one on the other, so that were you to pass a piece of stout cord down their central canal—which canal gives passage to the spinal cord—and hold one end of it high in the air, and shake it to and fro, it would wriggle like an eel. Other irregular bones are found making up the knee and hock joints.

11.—*Long* bones in forming joints have to expand at their ends, (see Fig. 2. *A* 1) and these expanded ends are covered by a substance which is yielding and elastic, and called 'cartilage' (Fig. 2. *A* 4) which acts like a buffer, and so lessens concussion. The two ends of the bone are bound to each other by strong unstretchable fibrous bands called 'ligaments,' (Fig. 2. *A* 2). Oil is generated just as it is in the sheath of a tendon by a synovial membrane (Fig. 2. *A* 3) and is represented in our diagram by a dotted line. When a joint is subject to more than ordinary concussion, as for instance, the 'knee' joint, provision is made for additional

FIG. 2.



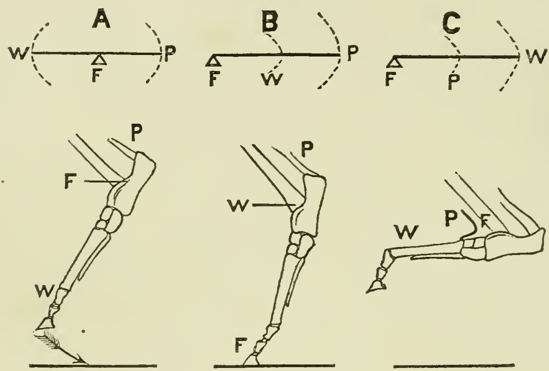
cartilage by irregular bones being interposed between the two ends of the long bones (Fig. 2. *B*), each of these bones being thickly covered on its upper and lower surfaces, where the concussion comes, by cartilage. So that in a section from above downwards through the 'knee' joint, instead of two buffers being interposed we find six. The bone above the knee, and the bone below it being in a straight line when the weight of the body is thrown upon them, much concussion would take place were it not for this arrangement. When bones which meet and form a joint are set at an angle, then of course there is less chance of concussion, and so we find less 'cartilage' needed.

12.—As there are three forms of levers, we must be careful to remember this, and we shall close this somewhat dry and relatively uninteresting lesson by a few remarks on the *mechanical* lever, and compare it with the *animal* lever.

The lever is an unyielding bar, (represented in the animal by bone,) capable of free motion about a fixed axis, called the 'fulcrum.' To this unyielding bar, 'power' is applied, (which in the animal lever is represented by muscle and its tendon). Lastly, we have the *weight*, *resistance*, or obstacle to be overcome by the power.

If the fulcrum (*F*) be placed between the power (*P*) and the weight (*W*), so that when the power sets the lever in motion the weight and the power describe *arcs*, the concavities of which are turned towards one another, the lever is said to be of the *first order*, (see Fig. 3, *A*). If the fulcrum be at one end, and the weight be between it and the power, so that weight and power describe *concentric arcs*, *the Weight moving through less space*, the lever is of the second order (Fig. 3, *B*). And if, the fulcrum being still at one end, the Power be between the Weight and Fulcrum so that the Power and Weight describe concentric arcs, *the Power* *moving through less space*, the lever is of the third order (Fig. 3, *C*).

FIG. 3.



We shall now give examples of these; first in mechanical levers:—

Lever of First order = the beam of the balance.

Lever of Second order = the common wheel-barrow.

Lever of Third order = the treadle of a lathe.

In the living lever we find one joint will illustrate all three orders according to its position with regard to the body. Let us take the hock joint, which in man is called the ankle. We find, still referring to Fig. 3, that we have in the living lever a power in front and another behind the leg bone.

Now to illustrate our three orders of levers, we find we have only to study the hock-joint in the trot. The first order is seen in the hock in the trot *after* the foot has been lifted from the ground. To bring it quickly to the ground we find the *fulcrum* at the true hock-joint, the *power* attached behind to the point of the hock, and the *weight* to be moved, are all the parts below the hock, including, of course, the foot.

To illustrate our lever of the second order, take the hock in the trot *when* the foot is placed *on* the ground. We now find the fulcrum and weight have changed places, but the power is still as in the first order *behind* the hock. The foot being planted on the ground is now the seat of the *fulcrum*, or fixed point, and the *weight* is the whole of the body which is thrown on to the true hock-joint, and is the obstacle to be overcome, and is being lifted and pushed forward.

Lastly, our lever of the third order is seen in the hock during the trot, when the hind leg is left behind after pushing the body forward, and has to be lifted and pulled forward before it can again be brought forward under the body, (this is the same action, and better seen, when the hind foot is being lifted to knock off a fly that is irritating the belly), the front power is now acting, and the weight and fulcrum are the same as in the example of the third order, or in other words, the power is in the middle.

Summarising what has been said of the three orders of lever as exemplified by the hock-joint in trotting, we have found first, that the weight is all parts below the hock when the foot is *off* the ground, and all parts above the hock when the foot is *on* the ground. Second, when the foot is off the ground and swinging backwards the lever is of the first order, but when swinging forwards it is of the third order, whilst it is of the second order when *on* the ground.

LESSON II.

THE NOSTRILS AND LIPS.

13.—The nostrils are those openings over the muzzle through which the air has to pass on its way to the lungs, and as a horse cannot breathe through his mouth, all the air he breathes *must* pass through his nostrils, so that they must be as *wide* as possible.

The nostrils are made up of muscle, which is covered with skin and hair.

The muscles are for the purpose of regulating the width of the opening. It is plain that when the horse is at rest he needs less air than when walking, trotting, galloping, or drawing a load, and so only breathes about ten or twelve times a minute. In doing so, it is quite plain that the opening of the nostrils need not be so wide, as when at work he breathes three times as quickly. The muscles are thrown into action the moment the horse has to breathe more quickly, and you will have noticed the large, stiff and wide nostrils of a horse that is undergoing severe exertion.

14.—The opening of the nostrils when the horse is resting and breathing slowly is a mere chink or slit, but in violent exertion the nostril opening is quite round, and often reminds one of the mouth of that ancient weapon the blunderbuss.

The muscles of the nostrils must be in good tone. All muscles when unduly rested lose their tone, but when only moderately used keep their tone. Perhaps of all the muscles of the body the muscles of the nostrils are the least likely to lose their tone, because the horse has only to walk quickly to be obliged to widen his nostrils and breathe quicker. Even in illness, the fever which so often accompanies his disease increases his rate of breathing, and so exercises the muscles of the nostrils. Sometimes, however, the muscles do lose some of their tone, and then, if you take and gallop the horse severely, the muscles vibrate and make a fr-r-r-r-apping noise. This peculiar noise disappears when the horse gets into regular work, and the muscle of the nostril acquires the requisite amount of 'tone.'

When the nostrils are a shade smaller than they ought to be and the horse is put to violent breathing effort, the muscles of the nostrils render the wall of the nostrils so stiff and rigid that the air in passing in makes a loud blowing noise, and clearly indicates want of nasal capacity. Such a one is called a 'high blower.' This is always a fault, and sometimes renders a horse worthless for violent effort, such as hunting, racing, and drawing extra heavy loads.

The nerve which supplies the muscles of the nostrils with the power of movement must not be overlooked. It comes from the brain and leaves the interior of the skull through a canal formed of bone, and close to the roots of the ears. You see it in the living horse on either side as it passes over the cheek near the root of the ear as three or four stripes as of thick whip-chord running along under the skin towards the nostrils. This nerve, after leaving the bony canal at the bottom of the skull near the root of the ears, has to pass through a gland, which produces the saliva or spattle. It is this gland which swells at the side of the face when he is said to have got the 'vives.' In the horse, should this gland swell, it presses upon the nerve we are speaking of, and stops its current, and (as this nerve supplies the lips, the muscle which closes the eye, also the principal muscle of the cheek,) when its current is quite stopped these muscles become paralysed and cannot move the parts, so that the lips hang down and swing about like pendulums; the eye always remains open with a fixed stare, and the cheek bags out and the nostrils cannot become expanded. All this can be brought about by a draught blowing on to the side of the head and giving a 'cold' to the gland and causing it to swell and press on the nerve. This state of things usually lasts from one to three weeks, or until the 'cold' disappears. The lesson we thus learn is this: see that the nostrils expand when the horse comes to exert himself, and also see that his lips are not swinging about like pendulums. Very old horses sometimes have pendulous lips from debility. If you are buying such a one give him a feed of hay, and watch him to see if he can grasp the hay with his lips or if he has to push his nose into it and seize it with his teeth. If he has to do this don't buy him, because he will spoil more food than he eats from it dropping out of his mouth when chewing: he will take twice the time to feed, and he can never keep his condition. Sometimes he swings the lips about in trying to seize a morsel, showing that some power in them remains. If this be so, present a pail of water to him and watch him drink, and see if he can purse his lips naturally, or if they are so powerless that he has to dip his whole muzzle into the water nearly up to his eyes. If he cannot keep his lips pursed and so keep up a steady drinking effort, don't buy him.

15.—Next, hold his nostrils open and look inside. The pink, or it may be bluish red membrane you see, ought to be covered with spots of water like dew. There ought not to be any ulcers or abrasions to be seen, or 'raw' spots of any kind. You will always, however, find a very small opening like a 'punched out' hole, but this is natural, and no notice need be taken of it.

16.—If there be any discharge from the nostrils, save a slight watery discharge, it may be that the horse is suffering from a 'cold,' or he may be 'glandered.' The colour of the discharge must be noticed, also its thickness. Then, again, you must notice whether it comes from both nostrils or only one. If it be from 'cold,' it may be variously coloured, even green, as when the horse is feeding on green food in summer. It also may be of any thickness from wateriness to ropiness, and yet only be from a harmless 'cold.' If, however, it be thick and gluey, and sink when put into cold water, or be tinged with blood, it is most likely that the horse is glandered, and if so, he will inoculate you and so kill you, if you are not careful. The suspicion of glanders is strengthened if the discharge is coming only from one nostril.

If you are buying a horse, see that a discharge from the nostrils is not cleaned away when your back is turned. The muzzle should have no streaks of discharge upon it, neither should it be wet as if sponged.

The bony nostrils is that part of the upper portion of the face between the muzzle and the eyes, and is immediately beneath the skin.

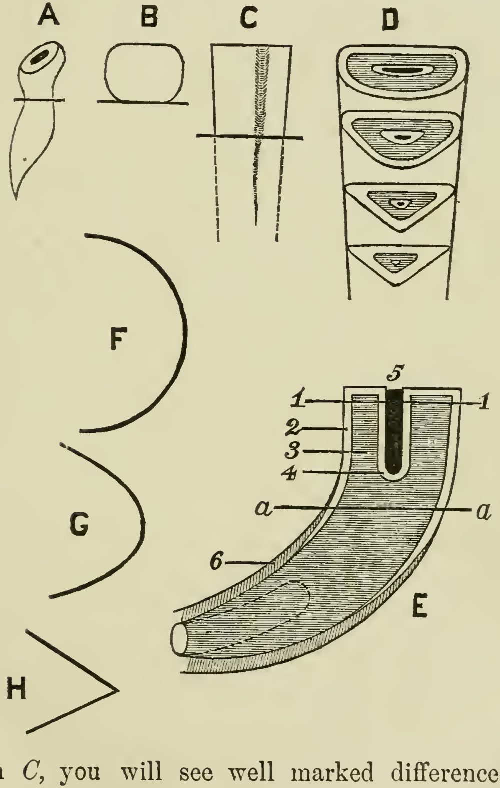
17.—The bony nostrils may be quite straight when the horse may be said to have a Grecian nose; or they may be indented or pugged; or they may be arched like a Roman nose. As *capacity* is so essential, it is evident that the Roman nose, though not the most sightly, is the best. A straight or Grecian nose is quite enough, if not too narrow. An indented or pug nose may also be capacious enough, but you must see that it is not narrow. If you suspect its capacity, you must remember the point when you come to examine the 'wind.'

THE MOUTH.

18.—As we have already said all that is necessary regarding the lips, we shall speak of the mouth as that cavity which contains the tongue and the teeth. The teeth are specially regarded in judging horses on account of their indicating the age. Horses, like ourselves, have two sets of teeth, one set for foalhood and a second set for mature age. The first set are called 'milk' or 'temporary' teeth, the second set are called 'permanent' teeth. The teeth of the same mouth are varied in position and shape, and receive different names. The front teeth being called incisors or 'nippers;' the back teeth being called 'grinders;' whilst between the two sets are the canine teeth, which are called 'tusks.' As the nippers and tusks are most exposed to our view when we open the mouth, we pay most regard to them, so that in speaking of the teeth we shall mean the 'nippers.'

17.—During the remainder of the lesson I must often draw your attention to the following diagrams of Fig. 4. So to begin: if you examine and compare a temporary tooth *A B* with a permanent

FIG. 4.



tooth *C*, you will see well marked differences in *size*, *shape*, and *colour*. If you look at the *front view* you will see that while the milk or temporary tooth is quite narrow near the gum (Fig. 4, *B*) (which is represented by a straight line in the figure) the permanent tooth is seen to be nearly as wide at the gum as at its upper or cutting surface; so that a milk tooth is said to have a neck, whilst *a permanent tooth has no neck.* You will see the permanent teeth are very little narrower at the part next the gum than they are at their cutting surface, or in other words they have *no neck.* Then again the permanent teeth are very much larger than the temporary ones, and are not nearly so white. Then again the temporary teeth are quite smooth on their front surface. Not so the permanent teeth. In the permanent tooth you see a groove, or perhaps two grooves, running from their cutting surface to the gum.

18.—Having determined which set of teeth you are examining, let us now consider the history of each set in its turn.

The temporary, or milk, teeth are 'cut' in the following order. At birth, or a few days after, two *central* nippers appear. At six weeks old two other nippers appear, that is, one on each side of the two central ones. Between the sixth and ninth month two other nippers make their appearance, one on each side of the last ones; and, as no others make their appearance, these are called the *corner* nippers, so that at last we have six nippers. Of course, six above and six below. Having thus cut the six teeth, (and we are only speaking of one jaw,) the foal is as a 'yearling' said to have *a full mouth.*

19.—During this first year, as might be expected, the nippers vary in appearance; those cut first coming to maturity first, so that the central teeth which have attained their maturity at two months present a strong contrast to the ones next them at that time, which, as we have seen, are only a fortnight old. When the nippers are first cut, their upper cutting surface is sharp like a knife, and, this surface meeting the surface of the teeth in the other jaw, wears away until the broader part of the tooth is come upon, and then, instead of a sharp knife-like edge we get a flat surface like a table-top. Every nipper thus changes, alike in temporary and in permanent teeth. Therefore, at nine months old, or even at twelve months old, whilst the centre nippers and those next to them have more or less well marked flat table-top cutting *surfaces*, the corner nippers have still shelly knife-like upper *edges.*

The upper surfaces, worn flat, will be seen to have two distinct colours, but this we may quite disregard in the temporary teeth, and pay attention only to those appearances already named.

It will be seen that during the first year the nippers are nearly useless because of the uneven surfaces of the teeth, some only being useable. Then again the mouth is very tender during the cutting of the teeth. During the second year the foal is in the full enjoyment of the services of his nipper teeth, which vary mostly in the *degree* in which they are worn down. Of course, the innermost ones being first cut, first come into use and are most worn down.

These temporary nippers begin to fall out or are shed at the age of two and a half years, or from that to three years, and are shed in the order in which they came; first, the central ones, and so on, so that we may say a foal has the use of his temporary or milk nippers from one year old to two and a half, or in other words, so far as his nippers are concerned, he has a 'full mouth' from one year old to two and a half.

20.—It is now time we began to study the anatomy of the permanent teeth in a rough and ready way. We cannot get out of it if we wish to be sure in telling a horse's age. Now-a-days teachers discard pictures as worthless, and teach by the aid of diagrams, so that you are not to feel your vanity touched by our using diagrams instead of pictures; for while you would find acres of diagrams in our great Medical and Veterinary Medical schools, you would be almost able to carry on your back all the pictures you would find. But the two are judiciously combined *sometimes;* the diagram to show the broad outlines and more evident markings: the picture to exhibit the detail.

Still referring to our Fig. 4, if you examine a *permanent* nipper tooth, when it is extracted and you can see the whole of it, you see that it is bent almost in the form of a crescent, (Fig. 4, *E*). In describing the tooth, we must suppose it divided into two parts; the visible part and the invisible part. The visible part is all that standing *above* the gums and is called the *crown:* the invisible part is that imbedded in the jaw and covered by the gums, and is called the *fang*. By studying the anatomy of a nipper tooth in a rough way, we can judge of a horse's age by the so called 'marks' of his teeth. In Fig. 4, *E*, is a section down the middle of a nipper tooth from front to back. Let the line *a a* represent the line of the gums, then all above this is the 'crown' and all below it the 'fang.' The great bulk of the tooth is seen to be made up of the part indicated by the number 3, and is called the *dentine*. This substance has a coating of a substance termed 'enamel' (*E* 2), for the part of the tooth *above* the gum or the 'crown,' but where the tooth gets fixed into its bony socket in the jaw, the 'dentine' is not covered by 'enamel' as in the 'crown,' but by a very thin layer of bone, *E* 6, called 'crusta petrosa.' This is a long hard name, but we have done with it. Now pay attention exclusively to the crown of the tooth (the part above the gum line *a a*), and you see that the enamel *E* 2, after reaching the cutting surface of the tooth, dips into the tooth and forms a little sack-like cavity filled up with black material (*E* 5). Now suppose you cut off with a saw a piece of the cutting surface, say through the line *E* 1 1 then you see on the *surface* of such a section in their order either way :—

Enamel : Dentine : Enamel : | Enamel : Dentine : Enamel.

And you must remember the 'enamel' is white, and the 'dentine' gray. Now see if you can make out these in Fig. 4, *D*, which shows four sections of a tooth, such as we made at (*E* 1 1). Notice the four sections of this tooth, and you see in the top section the appearances we have described very distinctly. You see the outer rim of white enamel which is called *encircling* enamel: then a broad circle of *gray* dentine: then a small circle of enamel called the *central* enamel, and this encloses the black material in the centre. So much for the top section, but before drawing your attention to the three sections below, I must first tell you that a nipper tooth gets *gradually narrower* from the cutting surface to the end of its fang, and whilst at its largest, from five or six years old to seven or eight, its upper cutting surface is somewhat ovoid, with the long axis from side to side having two sharp angles in front at either end. From this ovoid form it gradually becomes triangular, and it only remains to add that the depression in the tooth filled up by black material only reaches a little way down the tooth, and then you will be able to refer to the three lower sections of Fig. 4, *D*, to see the change in the aspects of the marks themselves and in the form of the tooth at each surface as the teeth wear down through age and use, from a broad ovoid form to a narrower triangular form; and, as a consequence, in the very aged horse the teeth do not present a compact mass when viewed from the front, but are more like so many pegs with spaces between them.

Lastly, on separating the lips of a horse in his prime, and viewing the closed teeth from the side, we see the large bold curve, as in Fig. 4, *F;* but as age advances and the teeth wear away, we get successsively, but of course gradually, the curve *G*, then in extreme old age the angular curve *H*.

21.—We saw that with the milk teeth the central nippers came first, then the two next them—one on either side—and finally the two corner milk nippers, and at nine months old to a year at most the foal had a 'full mouth' of nippers. First come, first wear out; therefore the two central milk nippers are shed at two and a half years; the ones next these are shed at three and a half, the corner nippers at four and a half. So that at five years old—that is giving the corner teeth six months to grow up to having at least a cutting if not a grinding surface—the horse is said to have a full mouth.

Note.—The permanent teeth push out the temporary ones, in order to gain the situation for themselves. If the work of pushing out is done for them they come up easier and quicker. This gives rise to a process of 'forwarding the mouth,' as it is called, that is extracting the corner milk nippers of a three year old in order to hasten the arrival of the full mouth that a four year old may pass for a five year old. This is a gross cruelty, on account of the work of a five year old being expected of a horse only four. Should a permanent tooth not push straight at the fang of a milk tooth, the latter is pushed on one side but not pushed out, and so remains by the side of the permanent tooth and may hinder the horse feeding to some extent. Such a tooth is then called a 'wolf' tooth. Wolf teeth are oftenest found in front of the front grinders.

LESSON III.

THE EYE.

22.—We now come to one of the four principal things which you have to see is sound and all right in buying a horse—namely, the eye. First take a glance at both eyes in good *daylight*, and compare their *size*. It is of the highest importance that they should be both one size, because if one is less than the other it is very likely that the lesser one has been attacked with inflammation which is called 'opthalmia.' Now 'opthalmia' is a disease that returns again and again, and destroys the sight. One of its effects is very often to leave the eye it has attacked *smaller* than its fellow. It also leaves other evidences, but these require a properly qualified veterinarian to discover.

The *colour* of the two eyes need not be alike and yet the eyes may be quite sound. The colour of the eye depends upon the colouring matter in the iris, a structure to be spoken of by and by. It may be absent in one iris, and brown or some other colour in the other iris. The iris which contains no colouring matter will be white, and the horse is thus said to have a 'wall' eye. This white or 'wall' eye is as good as its fellow-eye, but it gives the horse an odd appearance which at best is unsightly, but still 'wall' eyes may be quite sound.

23.—Whilst you are looking at the eyes in broad *daylight*, notice if the *eyelids* are all right. Sometimes they get torn with projecting nails and are injured to such an extent that they cannot cover and protect the eye. Also notice if the tears run over the cheek. The tears are formed under the upper eyelid, but deep in the orbit or socket of the eye, and wet the surface of the eye and then find their way to the inner corner of the eye and thence through a canal into the nose. It occasionally happens that this canal gets blocked up, and then the tears cannot get into the nose and so escape. When this is the case, they trickle out of the eye corner and over the face, and scald the hair off. This is often a curable condition, but very objectionable whilst it lasts. You will say 'how is it that we do not find the tears coming *out* of the nostrils if they escape into the nostrils as they do in the horse and in ourselves.' Well, because in health—except of course when we cry—the tears are only formed in sufficient quantity to keep the eye moist, just as the lining of the nose only forms sufficient watery material to keep it moist and no more. When there is more than suffices for this purpose we are said to have got a 'cold.'

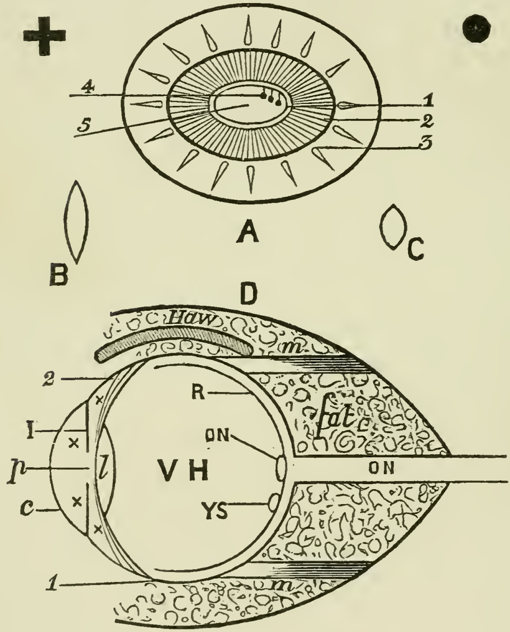
24.—Having examined the eyes in broad daylight, you will have to examine them *with a candle* within a stable with the door shut. If you can have a choice, choose a stable that has a window above the stable door, as it will be a further aid in using the candle.

25.—Before going further we shall have to study the mechanism of the eye roughly, or we shall not understand what to look for and expect.

In Fig. 5. you find diagrams that will aid us in demonstrating the more important parts of the eye. When standing in front of the horse and viewing the eye, you can see an outer circle representing what is called the *white of the eye*, and is really the outer covering of the eyeball. Perhaps you will understand it better if we take an example. Suppose you take an orange, and cut a round piece of the skin or peel out about the size of a half-crown piece, the whole of the *peel*, or *skin*, which remains bears the same relation to the orange that the outer coat, or *white*, bears to the eyeball, that is to say the skin which remains of the orange, and the white tunic of the eye in each case invests five parts out of six perhaps of its respective sphere.

We must make our orange do further service. When we have taken out the piece of skin we find the white rind underneath. Take a penknife and cut a hole in this white part, the same as in Fig. 5 *A* 5, the hole we cut will represent the opening known as the 'pupil' through which the light passes into the eye.

FIG. 5.



The remaining broad rim of white rind (Fig 5. *A* 2) will represent the *iris*. Now if you have a watch-glass the size of half-a-crown, and place it over the hole from which you at first cut the skin, the watch-glass will represent that glass-like covering of the eye which we call the 'cornea.' I fear we shall have to draw rather largely on our imagination to carry our illustration further. Let us see. Suppose you have a pair of spectacles with round glasses instead of oval ones, and you could remove one of these glasses, and (without rupturing our artificial 'iris') you could thrust it through the 'pupil' and place it immediately at the back of the 'iris,' this glass lens would then represent the 'lens' of the eye. Just a little further stretch of the imagination then no more. When you took the lens out of the spectacles (in imagination of course) you found it surrounded by the iron, silver or gold *rim* which held it. You have placed the lens in the orange as described, and now in place of a metal rim around it, suppose we have a sheet-like muscle encircling the lens and that the outer edge, all round, of this sheet-like muscle is fixed to the interior of the orange peel a little further back than the lens.

We now look at Fig. 5, *D*, and we find the diagram of a real eye in section. Now, you will see the parts marked in the diagram as we have described them. First: the greater part of the outer coat (five-sixths we said) is formed by the *white tunic* of the eye called the *white* of the eye, (Fig. 5, *D* 1). The remainder of the circle (our watch-glass) is the 'cornea' (Fig. 5, *D c*,) then behind this we have the *iris D I*. Then behind this again the lens *D. l.* with its muscle, the *ciliary muscle* (*D* 2.)

Let us describe the remainder of the eye by the aid of the lower diagram we are now looking at. That very large space marked *V H* is filled by a transparent jelly-like substance called the vitreous humour. Then you see the nerve of sight as it comes from the brain (*D, o n*) piercing the back of the white outer tunic like the end of a lead pencil, and when it has gained the *inner* part of the tunic it spreads out like a sheet of tissue paper, and *lines* the back of the white tunic *inside* and is known as the 'retina' (*D R*). In this thin filmy sheet or 'retina,' close to the *optic nerve,* is a little body called the yellow spot (*D Y S*).

26.—So much for the eyeball. Now let us see how it is moved. The eyeball is imbedded in the bony skull in a socket or case, partly of bone, called the 'orbit,' and being very delicate, this bony orbit is filled with fat, (Fig. 5, *D*), in which the eyeball is imbedded. In old horses and during illness this fat wastes away and allows the eyeball to sink in its socket. There are five or six muscles, (Fig. 5, *m m*) to move the eye. The ends of each muscle are attached, one to the bony socket the other to the white outer tunic. We have only two of these muscles depicted in the diagram, but in real life one muscle is attached to the upper part of the eye; one to the lower; one to the inner or nose side; one on the outer side. So that when the top one contracts the eye looks upwards, and so forth. There are two other muscles *obliquely* placed for rolling the eye, but these we will not consider. The four muscles named are called the four *straight* muscles, and when they all contract at once, the eyeball is pressed back into the socket and the 'haw' (Fig. 5, *D*) which is a thin sheet of grissle also imbedded in the fat and whose edge can always be seen on the inner angle of the eye, is pressed or squeezed out of the fat and made to project over the eye.

27.—We must now turn our attention to the front half of the eye as we see it in the living animal, because it is this we have to examine with the candle in the darkened stable. Still referring to the diagram, let us study the parts in their order, beginning at the transparent 'cornea,' (our watch-glass).

The light has first of all to pass through the cornea before it can pass through the hole we call the 'pupil,' and if the cornea receives any injury, as it often does from the whip, spots may be left which will split the light or otherwise daze the animal and make him shy. If, however, these spots are on the outer margin and not opposite the pupil, it is plain that the light will not be interfered with, or in other words, the spots are of less consequence.

Covering the outer tunic or white of the eye, there is a very delicate membrane we have not mentioned, but which holds many blood vessels. This is called the 'conjunctiva,' and is that we see so red when the eyes are 'bloodshot.' If a hay-seed gets into the eye this membrane reddens, and the eyelids swell and are kept closed and are suffused with tears. It is this membrane that is attacked in inflammation of the eye, so that you must see that it is not unduly red. In such horses there is a great quantity of dark colouring matter in it, so that the white of the eye is partly hidden behind it. This dark appearance is quite natural.

28.—We now come to the two most important structures of the eye, and without we know a good deal about them we cannot judge a horse thoroughly, but may be woefully cheated in purchasing a horse where we cannot call to our aid a skilled expert or veterinarian. The first of these two structures is the 'iris,' which acts like a curtain to a window and is really the curtain of the eye. It is a very delicate moving muscle, flattened like a sheet of paper and ovoid, having an ovoid hole in its very centre, (Fig. 5, *A* 5), which as we have seen is the 'pupil' of the eye through which the light passes. Now this hole, or pupil, varies much in size. When the eye is exposed to a bright light it becomes very small, but in the dark it enlarges to its widest. This is well seen in ourselves, but better seen in the cat. Put a cat before a window and you find the pupil diminishing almost to the size of a pin point. Then this muscle acts by enlarging or diminishing the 'pupil.' It does so in this way : Fig. 5, *A*, 2, represents the iris as viewed from behind. It is seen to be made up of inner circular fibres and longer fibres which radiate from these. When the pupil lessens, it is by the circular fibres contracting, but when it widens it is by the radiating fibres contracting. What we have to do in the darkened stable is to see that the 'pupil' diminishes and enlarges freely. For this purpose we cover the eye with our hand to darken it for half a minute or so when we expect the 'pupil' will dilate; then we place the candle close to the back of the hand that is covering the eye and suddenly remove the hand and watch the pupil contract, which it ought to do from the glare of the light being too much for the eye. In a darkened stable, and a candle held away from the eye, you will still see the pupil widening and narrowing, which is, of course, a sign that it is in good order and capable of acting as a curtain and keeping out bright glare which dazes the animal. It widens and admits all light possible when there is not much light to spare. When the pupil is very widely open it gives the eye a glassy appearance, and should this condition be permanent, as you will have seen it, no doubt, the disease called *Amaurosis*, *gutta serena*, or *glass-eye* is present, and the eye is worthless. It may be from disease of the brain.

Instead of being fixedly open, the pupil may be fixed and quite immoveable and closed, or nearly so. This serious flaw arises in this way. When violent inflammation seizes the eye and attacks the 'iris,' a gluey discharge may occur from the surfaces of the 'iris,' and the back surface of the 'iris' may then become stuck to the fore part of the 'lens.' (See Fig. 5, *I*, *l*.)

If you refer to the diagram of the iris, (Fig. 5, *A*) you will see two or three little black bodies hanging down, (Fig. 5, *A* 4) swinging from the roof of the 'pupil.' These are quite natural, and appear in the eyes of many if not in most horses.

We now come to the lens, which we represented by taking out a glass from a pair of spectacles. This lens (Fig. 5, *D*, *l*) is really placed close behind the 'iris' or curtain, and is for the purpose of *focusing* the rays of light so that they form images on the thin membrane we have before spoken of called the 'retina.' Get a pair of spectacles, or a magnifying lens, and hold it in your right hand, and with it throw a bright light from a window, or a candle, or gas jet on to the back of your other hand. Now move the lens gently to and fro, and you will see a beautiful little image of the window-frame, gas jet, or candle-light (whichever you are using) on the back of your hand. Now you have got this perfect image by moving the lens backwards and forwards between your hand and the light, and you will have found that *correct distance* is everything, that is to say, had you held the lens an inch nearer or an inch further off, you would not have got a sharp, clear image. Now look at Fig. 5, *D*, and you will see that *behind* the 'lens' there is the *V H*, or space filled with vitreous humour, and in *front* of it there is the 'iris,' so that it is quite evident that the 'lens' of the eye cannot be moved backwards and forwards, an inch forward now, an inch backward then, as you have done in your experiment, because the whole eye is only about an inch from front to back, so that the focusing of the image on the 'retina' by the 'lens' must be accomplished in another way altogether, and in this way the *shape* of the 'lens' itself is altered.

29.—We must say a few words about the construction of the 'lens' of the eye, or you will not understand what is meant by a *cataract*, so that after we have seen how the 'lens' is made we can see how it alters its shape in focusing. Turning to the diagram Fig. 5, *D l*, you see that the *lens* of the eye can be quite well represented by placing two ordinary old-fashioned watch-glasses together at their edges. Now if you could fill the cavity you thus form with stiff but very transparent jelly, you would thus get a rough representation of the lens of the eye. Now, in the 'lens' of the eye, our two watch-glasees are represented by a very delicately thin pliable membrane called the 'capsule' of the lens, and so the whole 'lens' being firm, but pliable, can be altered in shape by the 'ciliary muscle,' (Fig. 5, *D* 2) which is, as we have seen, attached around its margin, so that when this muscle drags the lens backwards against the stiff 'vitreous humour,' the foremost half of the *capsule* of the *lens* (our foremost watch-glass) is bent like a bow that is having its string pulled in the act of shooting, and the lens is thus altered in its convexity from being shaped like *B* to being shaped like *C*, Fig. 5.

The lens of the eye is quite clear and transparent like glass, when in health; but from accident, disease, or old age, it may become opaque and *milky*, and then the eye is said to have a 'cataract.' 'Cataract' may occur from a horse falling on his head whilst hunting, or in rearing and falling back and knocking the head violently against the ground; or by knocking the head violently against the top of a doorway—any violent blow on the head, in fact. It does so by rupturing the capsule of the lens (one of our watch-glasses) and letting in the 'watery humour' which occupies the front chamber of the eye, and which is marked *x x x x* in our diagram (Fig. 5, *D*). When the 'watery humour' gets into the substance of the 'lens' through a rent in the capsule, the 'lens' immediately begins to swell and become *milky* and *opaque*, and in a day or two the whole lens is swollen and white like milk. *Disease* causes 'cataract,' notably that disease in which a patient passes quantities of sugar with his water. *Old age* produces 'cataract,' by the lens shrinking and altering its proper structure.

When the 'cataract' is *complete*, that is to say, when the whole lens is affected, you see the milky white lens through the pupil, or in other words, the opening called the *pupil* instead of being black as midnight, has a chalky or white appearance.

But the 'cataract' may not be complete, that is, only part of the 'lens' may be white and opaque. A 'cataract' may be no larger than a pin's head, and may be situated in any part of the 'lens.'

30.—To test the lens we use our lighted candle in our darkened stable. The test is called the 'catoptric test,' and is very easily applied. You take the candle and place it a little in front of the eye, a few inches from it, when you see *three images* of the candle-light; one upon the surface of the 'cornea,' one upon the front capsule of the 'lens,' (our front watch-glass,) and the third still further back, upon the hindmost capsule of the lens, (our hindmost watch-glass). Now, after you have distinctly found these three images, notice that the *two front* ones are *upright* like the candle-flame, but the *hindmost* image is *upside down.* After quite making out this fact, gently move your light from side to side, and you will see that while the two front upright images move in the same direction as the candle, the hindmost one, which is turned upside down, moves in the contrary way to the candle. It is therefore evident that if the 'lens' is opaque and milky you cannot see the hindmost or inverted image, but you will only see the two foremost upright images.

The cataract, as we have seen, may not involve the whole lens, but may be just a little speck in any part of it. Of course, if this speck be towards the margin it may not split the light and so be a detriment, but we never can tell how long a small speck of cataract will remain small. With practice you can detect these small specks by the 'catoptric test,' but they are far more easily detected with a little round mirror having a little hole in its centre for you to look through, which forms the reflecting part of every opthalmoscope. Any one can use this very simple contrivance by holding it to his eye and reflecting the rays of a candle into the eye—the candle being held by the *side* of the head by some one else.

We have seen that the 'iris' from inflammation may become stuck to the lens and so fixed. But the 'iris' being a *moving muscle,* sometimes drags and tears itself away, and in so liberating itself, leaves bits of its structure upon the lens, which will also appear like small cataracts. In doing so it sometimes tears the capsule and lets in the watery humour, and so causes cataract.

This ends our lesson on the eye. It only remains for me to advise close attention to what has been said, and to advise the learner to take every opportunity of verifying his knowledge and noticing the many infirmities he will meet with, and studying them by the broad light which we have here attempted to shed upon the subject. There are other methods of thoroughly examining the eye, but these are only of use to experts, surgeons, and veterinary surgeons, who are devoting their lives to such subjects.

Caution.—Do not mistake the optic nerve which can be seen through the *pupil* of the horse for a cataract, but which is distinguished by the 'catoptric test.'

Note.—The whole retina Fig. 5, *D* R, receives images except the end of the optic nerve itself. To prove this close your left eye by placing your left hand over it, then hold Fig 5 at arms length and look fixedly at the cross, and you see the black spot as well. Now, still looking at the cross, move it gently towards you and as it approaches your face the black spot for a time ceases to be seen. The distance is generally seven or eight inches from the face.

LESSON IV.

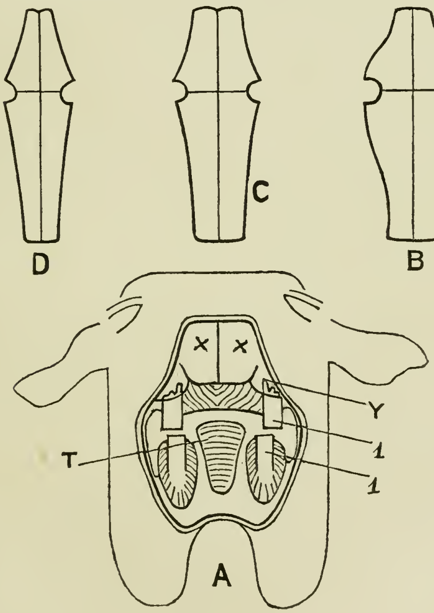
FACE AND HEAD.

31.—Having passed in review the nostrils, mouth, and eye, we must now review the face and head. We shall find that the face, as seen from the front, is of paramount importance in judging a horse, because the old saying, 'strength goes in at the mouth,' is as true to-day as it ever was. The saying, of course, has reference to the quantity and quality of food that is consumed. Now, no matter how much food is swallowed, unless it be of proper quality and so prepared by mastication or otherwise that the stomach can, in its turn, further advantageously dispose of it, strength will not follow. In order that large quantities of well masticated food may be swallowed, the back teeth, or 'grinders,' must have the following properties; they must have *large*, *flat*, and *regular* masticating surfaces.

But you will say what has all this got to do with the front aspect of the face? The reply is, a great deal, but you are not asked to take this bare assertion on trust. It is of the highest importance that you should understand the conditions requisite for the 'grinders' to have *large*, *flat*, and *regular* masticating surfaces. But you will have to follow the description, as you did in the case of the eye, before you can understand.

The molar teeth or grinders (Fig. 6, *A* 1 1) are

FIG. 6.



very large *cubical* blocks of bone which have to crush and grind down hard tough food, such as beans, oats and hay, and therefore require powerful agents in the form of huge muscles to work them; so that, you see, where you have such large blocks and such large powers to move them, you must have *room* or *space* sufficient for both. But it so happens that *lightness* is also required, and greatest lightness implies least material and with least material it must be disposed or shaped according to well-known geometrical laws; if you require the three conditions in one, namely, *size, strength,* and *lightness,* these geometrical laws are carried out *at the expense* of *room* or *space* if not in one direction, in another.

If you refer to Fig. 6, *A*, you will see a perfect model of lightness aud strength. It is the diagramatic representation of a section of a horse's head and jaws carried from above downwards across the head, somewhat below the eyes. The four pieces marked *I I I I*, represent four molar teeth or grinders, two in the upper and two in the lower jaw. They have all flat table-top grinding surfaces, the top one meeting a corresponding bottom one. Those of the lower jaw are set in solid bone, which is rendered light by being shaped like the letter *V*, that is to say having two branches meeting below. The front part in our diagram being removed, we can only see the section of the two parts of the lower jaw each holding a molar. Above the upper jaw are the large passages through which the air passes *A* *x x*, and are nearly hollow and form the back part of the bony nostrils, but the cavities *Y Y* are only there to allow of the bone being as light as possible, and as cavities are quite worthless. The upper jaw forms an arch, having substantial buttresses in the molar teeth and their bony sockets, and whose span is of gigantic strength and extremely light from its hollow construction.

If you notice a horse eating, you will see that the lower jaw is pressed upwards against the upper jaw, and moves from side to side. If the movement of the lower jaw on the upper one were a simple up and down movement, then the muscles could be *perpendicularly* placed and their bulk only allowed for, but seeing that the lower jaw has to be moved from side to side, the muscles have to be *obliquely* placed and so necessitates the branches of the jaw being wide apart at their hindmost part. But the lower grinders are somewhat narrower than the upper and so allow greater range of motion in grinding, so that *breadth of the upper jaw is essential* as well for allowing free masticating power, as for power to breathe freely through wide enough openings.

32.—This then *necessitates* width between the eyes, and width between the lower jaws. In the figure illustrating this lesson you will find three diagrams, *B*, *C*, *D*, representing front face views of three degrees of width. What has been said will explain why narrow-faced horses are often weakly, with narrow chests and long legs, and disposed to have 'thrushes' in the 'frogs' of their fore feet, and are also prone to diarrhœa. It would be beyond the province of this little book to enter into a lengthened explanation of these coincidences and shorter explanations would not suffice.

33.—The side face should be deep for the same reasons that the front face between the eyes should be broad, that is, for roomy nostrils above and for the efficient setting of the massive grinders.

34.—*Length* of head is not of such importance. It cannot well be too short so far as the chief requisites are concerned. When we find very narrow faces, we frequently find length of face great.

35.—The so-called forehead of a horse is the space bounded below by a straight line drawn between the eyes, above by roots of the hair of the forelock, and at the sides by the large muscles which lift the lower against the upper one. The breadth of the forehead depends upon the breadth between the eyes and the size of these muscles. It is almost impossible to judge the size of the brain in the living horse by breadth of forehead. Size of brain is no index of character in either horse or man. In either case, we can only judge of a brain by the quality and quantity of the thought, and so forth, it produces, so that we need not dwell further on the physical aspects of the head.

36.—The eyes should be as *large* as possible, and not be obliquely set in the face as in the Chinese.

In long narrow-faced horses we sometimes find this obliquity of the eyes, and this is an additional flaw.

37.—The white of the eye should not be too conspicuous. When too conspicuous it gives to both man and horse a *wild stare*, and is an almost unfailing sign of mental aberations, which lead to acts which we characterise as vice, such as biting, kicking, &c. The white of the eye is seen, not on account of there being more of it than usual, but on account of the eyelids being wider apart. This condition is known to doctors as the *insane eye*, and is seen by the least observant by attending Divine worship in any lunatic asylum chapel and sitting near the parson. This condition has been so connected with viciousness in the horse, that in Yorkshire it is a common expression among horsemen, "He shows too much of the white of his eye for my money." I would, however, guard you against condemning all horses with this form of eye as vicious, but have a special warranty against vice in purchasing one, and at all times avoid such when you conveniently can.

38.—The space between the lower jaws near the top of the neck cannot be too wide, for reasons we have before seen. There is also another reason why the branches of the lower jaw should be wide apart. The top of the windpipe ends in the *speaking box* called the 'larynx.' It is much larger than the remainder of the windpipe, and in men can be seen and felt as a large hard prominence which moves up and down when we swallow. It is also called *pomum Adami*, or Adam's apple. When the nose is held in towards the neck by the bearing-rein being over tight, this delicate box, which is made up of pieces of hard cartilage, moved by numerous delicate muscles, gets pressed out of shape and causes roaring, or grunting, or trumpeting.

This box is quite between the branches of the jaw in most positions of the head, and is a most delicately organised structure, and therefore soon thrown out of order, causing the above noises in moving. Now there is a disease called the Strangles affecting young horses, in which a gathering or abscess takes place in the space between the jaws, and therefore close to this delicate box, the 'larynx.' During the time the abscess is ripening there is necessarily great inflammation about this box, and if it lasts unduly long by being treated by so-called 'home' remedies, or worse still by the farrier, the inflammation is apt to injure the delicate little muscles of which the box is partly composed, and leave the animal a 'roarer.'

39.—All badly treated gatherings or abscesses are apt to leave behind them two evidences of their former presence, viz: thickening of the skin and parts beneath, and ragged scars. Therefore, always look for these between the jaws of a horse. The skin in this situation should be fine, the hair silky, and you ought to be able to bury your stretched out hand, laid lengthwise back uppermost, in this space: or, in other words, see that the space between the jaws be not *flush* with the lower borders of the jaw.

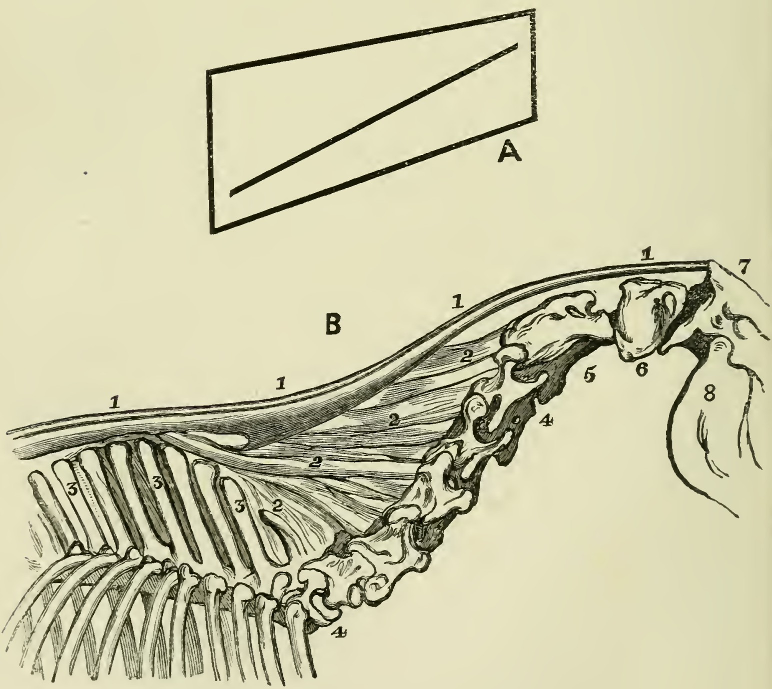
40.—The ears forming part of the head may here be noticed. They ought not to be too large, indeed they can hardly be too small. They vary in shape slightly, but very little.

LESSON V.

THE NECK.

The neck of the horse may be roughly stated to be an oblong, having the bones of the neck or cervical vertebræ as a diagonal; thus, (Fig, 7 *A*.)

FIG. 7.



We have thus a rough idea of its fundamental structure, and shall be able further to discuss the subject intelligibly. The column of bones is represented by the diagonal that divides the neck above and below into two triangles, the upper one being the larger and more clearly defined. On referring to Diagram *B* it will be seen that this upper triangle contains the great cervical ligament which supports the great overhanging mass formed by the head and neck. It will no doubt often have occurred to non-anatomists, as a matter of wonder, how such a weighty overhanging mass as that of the head and neck gets supported, and how it is kept from dropping down and dangling between the fore legs. It will be seen on reference to Fig. 7 *B* that there is a ligament occupying the upper triangle of the neck which has *two distinct forms*, a cordiform or funicular portion, 1 1 and a lamellary portion 2 2 2 2. The former is continuous, with the ligament running along the upper ends of the spines of the vertebral column of the back and loins, and then stretches along the upper part of the triangular space of the neck and gets inserted to the summit of the head at the back; whilst the other portion spreads from above downwards like a fan and in reality is given off from the upper or cordiform portion. This fan-like portion has six slips, which get inserted to the spines of the last six of the bones of the neck.

In the first lesson we saw that muscle was an active contractile tissue *which could become exhausted,* so that if the neck and head were supported by muscles, after a certain time, the head and neck would drop. This is never the case, because they are supported by the ligament we have been describing, which is made up of a congregation of elastic fibres which are devoid of feeling, and therefore are never tired and are quite as passive as so much india rubber, that is, the ligament stretches when anything stretches it and recoils when the stretching force is removed.

The next thing I must direct your attention to is that the cordiform or upper part of the ligament is *broad* at the top, and that the skin of the neck is separated from it by a quantity of fat imbedded in fibrous partitions. The amount of fat placed upon this ligament varies greatly. In the clean, light neck of the hunting gelding this fat is barely represented, whilst in low-bred animals, in stallions, and in those which have been castrated, after two years of age or after the procreative organs have assumed their functional activity, this fat and fibrous tissue lying along the cordiform tendon on the upper serface of the neck is of considerable thickness and forms a 'crest.' It is of course best seen in stallions, and gives their neck its peculiar shape. In the heavy, soft cart horses which are largely imported into this country from Belgium it is also a prominent feature. Some colts are purposely left till two years old before castration, on purpose to develop this fat and 'give them a neck,' as it is called. The quantity of this fibro-fatty substance in the neck principally, but not entirely, makes the difference between a gross 'fleshy' neck, and a fine clean neck, and when it is stated that there is no strength in this fibro-fatty mass, it need hardly be added that a clean, light muscular neck is as powerful as a gross, thick, heavy neck which is largely made so by this stored up fat; only, of course, the possessor of the latter can throw more weight into a collar, and is so far preferable for draught purposes. Besides judging of the quantity of this fibro-fatty structure by the sight, you can grasp the top of the neck, feel its thickness, and shake it from side to side.

41.—On each side of this ligament there are powerful muscles which fill up this upper triangular space and get attached to the bones of the neck, especially to the last five of these. We have seen that the bones of the spinal column have little movement *individually*, but *collectively* the column has considerable movement, which we likened to the wriggling of an eel. There are very small muscles which stretch from every bone of the column to the next bone in front of it, and are said to 'clothe' the spinal column. These muscles of themselves cause the wriggling movement of the column. The column, however, is acted upon by other muscles than those little ones stretched from bone to bone. These muscles are among the largest and most powerful muscles of the body, and bend the bones of the neck very much upwards, as in taking hay out of racks placed very high, or very much downwards, as in grazing. The part of the vertebral column forming the loins is also much bent in galloping and leaping, but the most movement is in the column forming the tail.

Shortly reviewing what we have said regarding the movements of the back bone or vertebral column we have found that it can *move itself*, and that it can *be moved*. That in moving itself it does so by the little muscles which clothe it, and that the amount of this movement only amounts to what we have, somewhat inelegantly, termed a wriggle. That *in being moved* by muscles from without, the motion is far more extensive. Lastly, we found that there was most movement in the tail, the next in the neck, and then in the loins, so that we have only to add that there is next to no movement in the back, and as has been mentioned, the bones of the croup are glued together and quite immovable.

Having said enough for the present about the 'back-bone' or 'vertebral column' in general, I wish now to fix your attention upon that portion of it, made up of seven bones, forming the neck. In the fore part of this lesson we saw that the bones of the neck ran diagonally, from below upwards and forwards, and we have since seen that whether it is straight or curved depends upon the action or inaction of certain muscles. When the horse is standing quietly at rest the elastic ligament simply suspends the head and neck, and in doing so the bones of the neck are nearly *straight*, having only the faintest possible curve, or in other words, the neck at rest is at its straightest. When the neck is not at rest, the bones of the neck will be bent according to the attitude of the horse, and, as we have seen, the muscles filling the upper triangle, being inserted into the hindmost bones of the neck, are most concerned in altering its shape.

Referring to Fig. 7, *B* we find that the hindmost side of the upper triangle depicted in Fig. 7, *A* depends for its depth upon the length of the ‘spines’ of the bones of the vertebral column of the foremost part of the back. This part, horsemen know as the ‘withers.’ It therefore follows that the higher the withers the greater the power of raising and bending upwards and backwards the bones of the neck, or in other words, *the higher the withers the greater the power of holding up the head and neck.* So that with high withers, that is with a *deep* triangle, the large muscles of this region not only act with the least expenditure of power, but the efficiency of space from above downwards enables large muscles to occupy this region without making the neck thick, because great and powerful muscles can be stowed away in a space which though narrow is very deep; whereas for the same bulk, and as we have seen strength, to be stowed away in a less triangle, the space *laterally* has to be encroached upon. So that given the same weight of head, and strength and length of neck, the higher the withers the thinner from side to side will be the neck, hence we find as a general thing that horses with low withers have more, so called, fleshy necks than those with high withers, because these muscles are stowed and have to act at a greater disadvantage.

THE NECK AND HEAD.

42.—We have next to consider the neck and head together as weights and as fulcrums, also as power. The head as a whole may be regarded as a *solid mass* attached to the foremost part of the neck at a *variable* angle. The upper and foremost part of the bones of the neck meets the head at its very top, (Fig. 7, *B*) that barely two inches of the head is above the bony juncture of the head and neck.

By this arrangement we get a lever of the first order which moves the head as a rigid bar up and down, the neck being fixed and acting as a fulcrum. The upper arm of the lever, we have said, is about two inches in length only, and so allows it, whilst moving through very little space itself, to move through great space the lower and longer arm of the lever made up at the head generally. The head has a side to side movement also, but we shall not stop to consider it in any way because we think our ends may be gained without this. Again reminding you of what was said about the superior triangle of the neck being occupied by muscles, which get attached to the last five bones of the neck, and of course when acting draw these bones upwards and backwards, there are positions, as for example, when the horse during the act of leaping a height is in a rearing attitude, and poising the body the instant before taking the spring, when the neck has to be drawn upwards and backwards, and the muzzle drawn well in to the neck, in order that the face may be conveniently situated for the animal to look straight down upon the object to be leaped over. In such a case the neck assumes the most marked double curve. The hindmost curve is first produced in the way we have mentioned, and the bones of it being fixed allows the part to become a *fulcrum* for the muscles acting at the lower side of the neck to draw the muzzle backwards. We have next the neck in one long curve, and the head extended as when the horse is feeding out of a very high hay rack. Next we have the neck straight and the head extended, as in the race-horse during the hottest part of the race nearing the winning post, and, as we have seen, the neck and head may be at rest and almost at right angles.

In our first lesson we saw that muscles, when in the full enjoyment of their highest functions, were said to be in *tone*. We have also seen in this lesson that muscles alter the curve of the vertebral column, more especially those parts of it forming the neck and the tail, so that it follows as a corollary that if the muscles of the neck habitually act in one position more than in any other position, the neck will become more and more moulded into that position. Hence we see the seasoned carriage-horse with powerful highly developed muscles of the neck, which gives to his neck a more massive appearance with its double curve. The bearing rein, judiciously applied, effects this by compelling the horse to keep his head up and his nose in, which no doubt is tiring at first, till the muscles of the neck get into condition ; just as in the case of the raw recruit who has to keep his head up, shoulders well back, and the palm of the hand open to the front. The muscles in six weeks or less get into tone, and there is an end to pain from restraint.

The bearing rein does this good, it causes development of the muscles of the neck, and enables greater weight and strength to be thrown into the collar. Consequently it enables those who drive pairs to have both breeding and substance.

In concluding this lesson, we have just to remind the reader that the neck has two sources of bulk, namely, the fibro-fatty mass which we have before discussed, and the forced development of the muscles. So that we may have both these conditions in the same neck, or one only.

We shall have more to say about the head and neck in our next lesson.

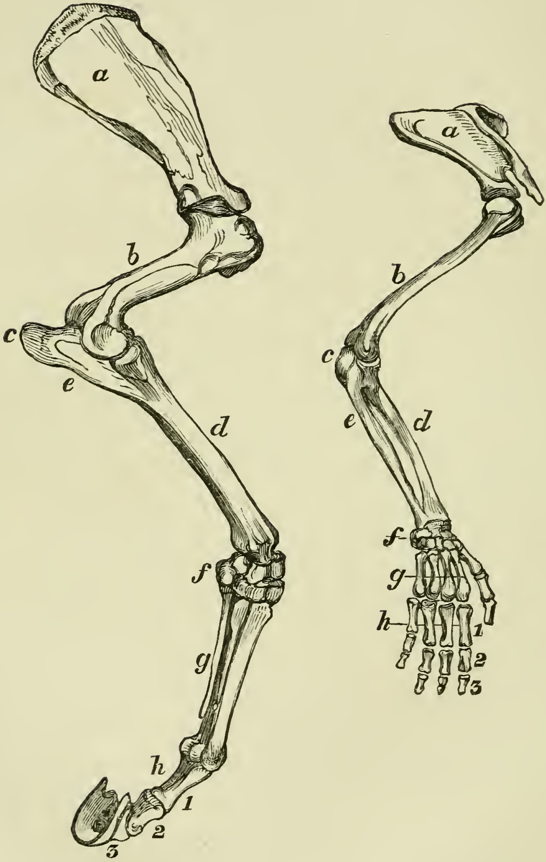
LESSON VI.

THE FORE EXTREMITY.

The general student may not know what is meant by the fore extremity, so I shall have to explain it. Our arms and hands are called our upper extremities, our legs and feet our lower extremities. The words upper and lower being used on account of our upright position of body. Quadrupeds having horizontally placed bodies are said to have fore and hind extremities, corresponding to our upper and lower ones.

43.—The horse's fore extremities are made up of all three kinds of bones, long, flat, and irregular. The topmost bone is a flat bone, and the only flat bone, and is called the 'scapula' or 'shoulder-blade.' All the other bones are of the long kind, except the little bones in the so-called 'knee' joint, we have before alluded to in paragraph 11, and one or two little bones we shall afterwards speak of.

FIG 8.



Fore extremity of horse. Upper extremity of man.

a. Scapula, or shoulder blade.
b. Humerus, or arm bone.
g. Metacarpal bones.
1 2 3. Phalanges.

c. Elbow.
e. Ulna.
d. Radius, or bone of forearm.
f. Carpus, or knee (wrist.)
h 1. First phalanx or suffraginis.
2. Second „ or coronal.
3. Third „ or pedal.

The bones of the fore extremities are of *various lengths*, and from the top of the arm bone down to the foot they *gradually lessen in thickness.* Also please to notice that the so-called 'knee' joint is a misnomer, as it is the part corresponding to our wrist joint, and has the same number of bones in it and of the same shape nearly, but larger. From our wrist joint five lengths of bone proceed, but in the horse, who is a *solipede*, only one length proceeds. This one length faithfully represents our middle finger from the wrist joint to the tip covered by the nail. Now, beginning at the shoulder-blade and going downwards, let us compare our extremity with its homologue, as anatomists call it, in the horse. You are not to be impatient and question the use of it, until you have patiently waded through what I have got to tell you, and then say whether it is of use. The two extremities are given in Fig. 8.

44.—The scapulæ of man and horse are both flat bones and both triangular bones, with a very strong ridge of bone running down their middle or nearly down their middle. This ridge of bone serves many purposes. First it strengthens the bone without adding materially to its bulk, just as the engineer shapes his iron which has to bridge across a space and to bear great weight, and have as little weight as possible. Second, you notice this 'spine,' as it is called, is less in proportion in the horse than it is in man, and that in the horse it is not continued into a long strong process. The reason of this difference is that the horse only uses his fore extremities to walk with; he has no 'collar' bone or 'clavicle,' as it is called by anatomists. Now the collar bone is a long bone at the top of our chests in front, shaped like the old-fashioned letter *s*, like this ſ, and it has one end placed against the top and side of the breast bone, but its other end meets the extreme tip of this spine of the scapula and props the shoulders back, and so keeps our shoulders well back at all times. Were it not for this bone, when, in using our arms, we stretched them forward, there would be nothing to prevent our two shoulders almost meeting in front. It is the relative length of this bone that determines the appearance of our shoulders. If growing children are allowed to sit with their shoulders huddled up, the two ends of this bone are unduly pressed upon, and the double curve is increased and the collar bone more bent, and, as a consequence, more shortened, and the shoulder blades, not being duly propped back, stick out behind, and the child grows up 'round shouldered.' It is owing to the slightly greater length of this bone which gives Frenchwomen their more graceful shoulders and chest. Lions, tigers, cats, &c., use their fore extremities for seizing things and holding them, so that they have clavicles or collar bones like men and women. A third use of this 'spine' of the scapula is that it acts as a fulcrum or fixed point for muscles, also as a place for insertion for tendons.

45.—The next bone called the 'humerus' or arm bone, will be seen to be exactly alike in both cases, only it is relatively very much longer in man. In both it is a powerful bone, but especially so in the horse. Extremely large muscles clothe it.

46.—The next two bones are the radius and ulna. In man, both these bones are continued from the elbow joint to the wrist as *separate* bones, but you will notice that in the horse the ulna, after helping the radius to form the elbow joint, coalesces with the radius, so that the two in a full grown horse look like one bone. This being so, the ulna is said to be *rudimentary* in the horse.

47.—The bones of the carpus are nearly alike in both, only, of course, larger in the horse. We shall call this the knee as usual, although, as you see, it is the wrist.

48.—There are five metacarpal bones in our hands, but the horse has only one which is fairly represented by the metacarpal bone belonging to our middle finger. You see two small metacarpal bones in the horse, but these are dwarfed and only *rudimentary*, and in the very aged, stuck to the larger 'metacarpal.' Notice, though, that the tops of all three articulate with the bones above them, *i.e.*, with the lower bones of the 'carpus' or 'knee.'

49.—The remaining bones explain themselves almost. Taking the bone in our middle finger from the knuckle to the first joint, we find it corresponding in everything but size to the long pastern bone of the horse.

50.—The next bone to this again corresponds with our next bone in the middle finger, but is relatively very much shorter and broader.

51.—The last bone is very highly developed in the horse, and is called the pedal or 'coffin' bone. In ourselves it is little more than rudimentary, on account of its not being called upon as a lowest point to bear the weight of our body. We can very distinctly see the resemblance it has to the same bone in the horse in the skeletons of those who, during life, used their fingers in hard heavy toil.

52.—The next three bones are sessamoid bones, and are very specially more related with the long tendons which stretch from the back of the knee to the foot.

So much for the 'bars' of our levers which we saw were in the animal, the *bones*. Now for the *powers* of the animal levers which we saw were the muscles with their tendons.

53.—On referring to Fig. 8, *E*, it will be seen that we have the bones of the fore extremity hidden or clothed by their muscles. This, however, is a picture or a faithful representation of the parts as they are in reality, and as the origins (fixed points) of the muscles and their insertions (moveable points) are very numerous, it will be useless to describe the origin and insertion of each muscle, but by the aid of diagrams we can see these living levers to greater advantage. I will, however, draw your special attention to two things. First, you ought to get a mental picture of this Fig. 8, *E*, in order that you may be able to recognise it as seen in the living horse, covered, however, by the skin. Secondly, please to notice that all the parts from just above the 'knee' are made up of the *bellies* or contracting parts of the muscles with hardly any visible tendon, but that from just above the knee to the foot all is tendon and bone together, not a single *belly* of muscle. Perhaps there is a third point you had better notice, namely, that of the bulky fleshy part, the greatest bulk is at the back of the shoulder blade and arm bone, the shoulder getting more and more bulky as it descends. Look steadily first at the column of bones unclothed until you can see them in your mind's eye through their fleshy clothing, because I give you warning that we are now going to represent all we have got to say further by straight bare lines only.

54.—Before going any further, we must revert to the dry subject of levers. Let me impress upon you this universal law, that power and speed are always related to each other, but that this relation is always *antagonistic*. Expressed in other words it is this, 'if you gain power you lose speed,' which is only saying, of course, that 'if you gain speed you lose power.' This universal law does a great deal for us by acting as a wholesome check to our enterprise. Were it not for this antagonism we should build ships that would convey cities instead of their present modest loads, and these would run at speed calculated by seconds instead of days and weeks and so forth. This law has existed, and will exist, through all time. We, however, try to unite the two things as closely as possible; the 'Great Eastern' steamship for example. This *artificial* combination is nowhere more striven after than in our breed of horses, the English hunter for example.

55.—We shall make this antagonism between *power* and *speed* do us good service here. It enables us to include every horse under the sun under three logical divisions, namely.

1.—Horses of Speed, *e.g.* Racehorses.

2.—Horses of Power, *e.g.* Draughthorses.

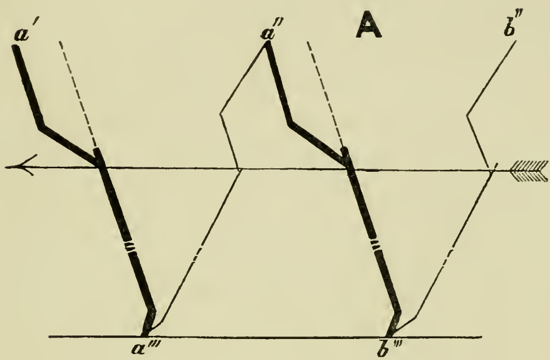
3.—Horses of Power and Speed, *e.g.* Hunters.

It is apparent that the first two, being extremes, will be in the minority, because most of our wants require a combination of power and speed.

56.—We must just allude to one other point, and that is the rhythm of movement. Let us take a simple movement, such as walking, and see what the fore extremities do and are down to in this rhythm. It will be seen on reference to Fig. 9, *A*, that an attempt has been made to represent this rhythm by a diagram which really represents two rhythms. It will be seen that either rhythm is included in a parallelogram made up of two *equal* triangles, a' a'' a''' and a'' b'' b'''. They are equal because they are on the same base, $a''' \ b'''$, and between the same parallels $a' \ b''$, $a'' \ b'''$.

It will be seen that a rhythm is begun when the foot is on the ground, as at b''', and completed when

FIG 9.



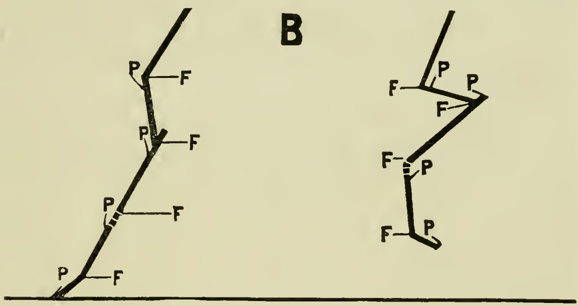
the foot reaches the ground, as at a''', and the limb has gained the same relation to the body, (represented by the arrow,) as at $a' \ a'''$ Take the parallelogram $a' \ a'' \ b''' \ a'''$, then it will be seen that the leg is flexed and extended within the triangle $a''' \ a'' \ b'''$, and that the body swings forward and brings the leg from position $a'' \ a'''$ to $a' \ a'''$, and this movement is accomplished within the triangle $a' \ a'' \ a'''$. It is needless to remind the reader that in the walk one fore foot is on the ground when the other is off it, therefore the fellow leg is bearing the body's weight whilst the foot is being put from b''' to a'''.

In passing forward the foot from b''' to a''' the leg is

1.—Flexed.
2.—Dragged forward whilst flexed.
3.—Then extended.

Now we saw that the spinal column had its own intrinsic muscles by which it moved itself, and we saw that this movement was a wriggle, and we also saw that it was moved by muscles from without itself, or extrinsic muscles. So it is with the limbs, they can flex and extend themselves, but they require muscles which have their fixed points elsewhere to move them bodily onwards. Now, referring to Fig. 9 *B*, we find the limb flexed as represented by the right hand figure. After being so flexed were it not to be dragged forward by a muscle from without, but simply to again extend itself instead of alighting at a''' it would drop somewhere on the line between a''' and b'''. In order to be carried from the flexed position to the position a'' a''', *we find a long tape-shaped muscle moves it forward through the distance we have named*, and that this muscle has *the bones of the neck and top of the head for a fixed point or fulcrum.* This is a very important point for you to remember. A fulcrum must be a fixed point, therefore when this muscle is acting, the neck must be fixed because this muscle has most extensive origin from it. Its name is 'Levator Humeri,' or in English, lifter of the arm. This is a misnomer, because the muscle does not lift the arm, but lifts the whole shoulder bodily upwards and forwards *according as the neck is situated.* This 'levator humeri' arises from the vertex of the head and from the foremost *four* bones of the neck, also through a strong elastic medium it arises from the elastic ligament of the neck. After this extensive origin, it gets a most extensive insertion to the *shoulder* as follows; the spine of the scapula or shoulder blade, the point of the shoulder, the

FIG. 9.



strong outer ridge at the top of the arm bone and to the arm bone at another point near its lower end.

As the free and extensive movement of the shoulder mainly depends upon this muscle, and the longer the belly of a muscle the greater the muscle's capability for contraction, and further, as this muscle is co-extensive with the neck, it follows that *the longer the neck the more extensive the shoulder movement.* Again, as this muscle is attached to and runs parallel with the bones of the neck and its fibres are also parallel with the bones of the neck, it follows that *the shoulder will be dragged bodily along the line of the bones of the neck.* Therefore, a horse having his head well up will necessarily lift his *shoulders* bodily upwards and forwards, whilst he will only drag his shoulder forwards whilst galloping with his neck and head nearer to the ground.

Never forget that the shoulder *is always dragged bodily in the line of the neck.* For high action then the first requisite is that the head and neck be held well up or the shoulder will not be lifted well up, and so forth.

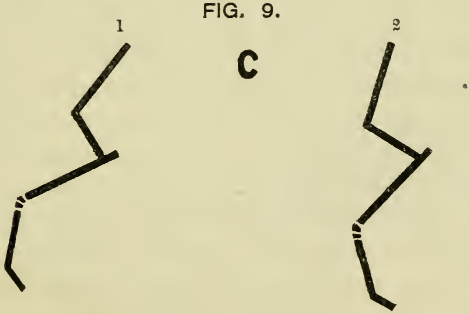
57.—Flexion and extension take place by means of the muscles belonging to the limb and not from muscles having their origin elsewhere. By referring to Fig. 9, *B*, we see a fore limb in *extension*, and see also that all the powers (P) are applied *in front* of the limb. In *flexion* we see Fig. 9, *B*, that all the powers are applied at the *back* of the limb. Looking at either of these figures we see that in every case the *power* is placed very much nearer to the *fulcrum* than the *weight*, the weight in each case may be regarded as all the parts beneath its respective fulcrum, so that it is evident that speed is gained at very extensive sacrifice of power In all horses' limbs, no matter what their length and strength, there is always this relation of power to fulcrum, so that in all horses' limbs extent of movement or speed is provided for more than power.

58.—The shoulder blade has two distinct movements. We have seen that it is dragged forward by the levator humeri muscle. Its most extensive movement is that of its lower end which gives to the whole blade a pendulum movement. Both these movements are effected by this muscle for the most part.

59.—The arm bone has also two movements. It is dragged backwards and forwards by the levator humeri muscle. Its greatest movement, however, is a pump-handle movement, having its fulcrum or fixed point at the shoulder point.

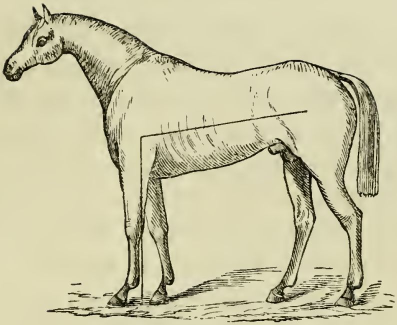
60.—It will be seen on reference to Fig. 9, *C*, 1, 2, that we have two fore limbs in flexion. The figures are alike, but placed at different obliquities. On comparing the two it will be seen that with the same

FIG. 9.

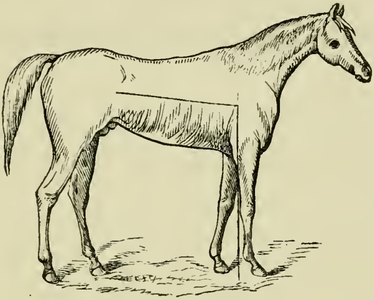


amount of flexion the 'action' will be high or low *according to the angle formed by the body with the scapula or the limb's most fixed part.* By further comparing 1 and 2 it will be seen that 1 looks upwards and forwards, but that 2 looks forwards only. There is just one other point we must be clear upon, and that is the relation of the long axis of the fore limb to the long axis of the body. Let us agree in regarding the long axis of the fore limb at the normal when the horse is standing straight on both fore limbs which must be perpendicular when on level ground. It will now be seen that the long axis of the fore limb is not necessarily at right angles with the long axis of the body. We have divided horses into three classes, and adhering to this division we find on referring to Fig. 10, that the angle formed by the long axes before referred to in the two fleet horses 'Fisherman' and 'Saunterer' are greater than a right angle, thus enabling the horse to 'cover more ground,' as horsemen term it. But on reference to the diagram of the Clydesdale horse, it will be seen that the two axes are at right angles. I have chosen the three from that most excellent work on the horse by Mr. Walsh (Stonehenge). In the greatest speed the long axes of the body is of necessity tilted downwards and forwards. In the heaviest draught the weight has to be thrown forwards into the collar, and the long axis of the body also thrown slightly downwards and forwards; but very much less so than in the former case. Where high 'park' action takes place, the long axis of the body must be upwards and forwards. These things being so, it follows that for either speed or action, or both, the

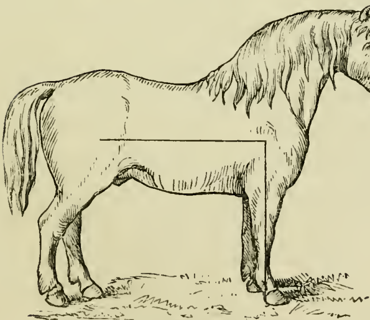
FIG. 10.



'Fisherman.'



'Saunterer.'



Clydesdale Horse.

fore limb must be placed bodily well forward, and have its long axis well in advance at its base. The horse is then said 'to cover plenty of ground.' This necessitates, as we have seen, plenty of obliquity of the shoulder blade, or in other words, the top of the blade must be well back and the shoulder point well forward. In heavy draught, the centre of gravity must be thrown well in front of the fore limbs, and kept in this relation to the rest of the body, and the long axis of the limb throughout looks downwards and forwards, and its extension forward at the base never gets beyond the perpendicular.

LESSON VII.

THE FORE LIMBS.

Having come to some general conclusions regarding the fore extremity, it will be easy for us now to go quickly over a consideration of each part separately.

61.—The shoulder blade must in all classes of horses be of good length and breadth to afford space for the attachment of the many powerful muscles which take their origin from it. In the race horse it must be placed very obliquely, in order that the great length of arm required can be placed sufficiently downwards and forward, so as not to interfere with the saddle girth. The arm bone, and consequently the arm must be longer than in any other class of horse, and the angle between it and the scapula also be very great. The fore-arm also of the race horse must be long. These conditions necessitate that the 'knee' of the racer be *very near the ground*, and as the pasterns must be duly long, and, when walking, be rather upright, in order that the weight of the body in fast galloping may not unduly bend them—it follows that all this length of parts is at the expense of the metacarpal bones, which must be proportionately shorter than in any other class of horse. Indeed the metacarpal bone cannot be too short and stout in the race horse.

62.—For draught horses the shoulder blade has need of being extremely *broad*, and placed more upright, in order to fill the upper half of the collar well when the body is thrown forward. The arm bone must be also short and stout, and at a less angle with the scapula. These conditions will enable the arm to be placed further back, and the fore legs generally to be placed *well under* the body, if possible, a little behind the perpendicular. The remaining long bones of the limb from the elbow downwards cannot be too short and thick in order that the horse may be on short powerful legs. The fore-arm and the shins thus appear of nearly equal length.

63.—The third class, of which the hunter is a type, must have a lengthy scapula, of good breadth and set well back. The arm must be in length longer than in the draught horse, but not so long as in the race horse. It also must be placed at an angle with the shoulder blade greater than the cart horse, but less than in the race horse. The fore-arm must be of medium length, also the shin.

64.—The knee in all classes must be very large, that is very *deep* and *very broad from side to side* in order that it may be well provided with buffer material as described in paragraph 11. It must not be narrow from before backwards at its *lower* part, or the horse will be what is known as 'tied in at the knee.'

65.—All the bones above the knee being clothed with muscle, we have to see that these are large and in good tone. By referring to Fig. 8, *E*, we see at a glance what the form of the parts must take in perfect development. From the knee downwards, however, we have for the most part bone not so clothed, but clearly defined in outline. The metacarpal must be stout in all cases; very broad from side to side, and of good size from behind forwards. The powerful tendons at the back of it must also have the same general outline as the bone in front of them, and they must stand out in clear relief from the bone. The outlines of the bone and tendon cannot be too distinct. The suspensary ligament which is an unyielding structure attached to the back of the metacarpal bone and again to the back and sides of the phalanges and so slings the fetlock joint, is well seen between the metacarpal bone and the tendon, and can be felt in its lower third above the fetlock joint.

66.—The pasterns must be broad and massive. They must have plenty of length in the race horse, and be rather upright when the horse is standing, or only walking, in order that the fetlock joint may *yield well* in the gallop, and in doing so may not come too near the ground.

In draught horses they must be less upright, and they must be short and very stout.

67.—The feet of all horses must have the same general characters. The fore feet must be somewhat oval with their long axes from side to side; the hind feet too must be somewhat oval, but their long axes is from behind forward. The wall of the foot in front must be in a line with the front outline of the pastern when the horse is standing. The line formed at the top of the foot where the hair and hoof meet must be *nearly* at a right angle with the front line of the foot and pastern, so that the heels will neither be too high and the foot 'boxy' nor too low, and thereby tender. The sole of the foot must be well *arched*, and the frog large, wedge shaped and unbroken or ragged. The foot must also have a bright shining gloss upon it like our own nails. Shoeing-smiths ought not to be allowed to remove more of this bright substance than they can help at the time they are rasping the turned ends of the nails, with which they fasten on the shoe, as it is this glue-like substance which keeps the fibres of the hoof from splitting. They ought never to be allowed to pare the sole of the foot and so weaken the arch on which the column of bones rests. After duly warning the shoeing-smith against the infringement of these rules, horse owners should instantly dispense with the services of one who abuses the rasp and drawing knife. In order to detect abuse of the rasp, horse owners should forbid the smith to put grease upon the hoof, and gloss over the injury he has inflicted with the rasp. Grease or hoof ointment may be put on after inspection has been made of the parts.

68.—The fore limbs should be set on, so that when the horse is standing the limb may neither be turned in nor out. *The breadth of the shoulders* as seen from the front will vary according to their muscularity, but *much more* according to their *relative position with the trunk.* This depends upon the chest being cone-shaped. The chest of the horse is somewhat cone-shaped with the apex of the cone pointing forwards, and the base pointing backwards. It is evident that the further the shoulders are from the point of the cone the further will they be apart from each other. The fore legs of the horse are sometimes said to appear 'to come out of one hole.' They may, as we have seen, be quite as muscular as shoulders set wider apart. Width of shoulders is desirable for collar work, so that the fore legs have need of being placed wider apart. We shall say little of 'action' because that is involved in the more general consideration of the limbs; but we must remark that when the foot is lifted in flexion, the lower part of the limb should be also straight with the long axis of the body when viewed either from the front or rear. The foot turned out when lifted and flexed is said 'to dish.'

The fore limb of the racer does not *necessitate* close action, or as it is termed 'daisy cutting' action.

*yield*ion is very limited, not on account of the limb come so formed as to preclude it, but the animal In c seldom occasion to lift his feet, on account of they rnearly always on level unbroken ground, that 67.- and conservation of energy alike tend to close gener action. With horses used for speed and power, whath, as we have seen, includes most horses having thego over mixed ground, higher action becomes lotbitual, and in going fast on uneven ground they fnust habitually lift their feet well, and keep them well in advance of the body, or they must stumble and fall. Draught horses too go over all kinds of ground, and get into the habit of lifting their feet well from the ground, but in their case slower speed gives them time to rectify a false step that would bring the subject of quicker movement to the ground. Then their limbs are placed more under the body and, being shorter, the action takes place *under* the body and not in front of it.

THE TRUNK.

69.—We must now pass in review the trunk of the horse, by which we mean the 'chest' and 'belly.'

70.—The chest, as has been before observed, is cone-shaped, having the apex of the cone pointing forward and its base backwards. This cone shape is very effectually hidden from our view in the living horse by those large muscular and bony masses, the shoulders, being placed by the side of the apex of the cone and extending backwards. The cone is made up of bones, having the backbone and upper end of the ribs for a roof, the ribs for sides and the breast bone for the floor. This bony framework contains those vital organs, the heart and lungs. In animals used for speed and power the chest must be very large, because speed and power expend much oxygen, which the lungs have to procure for the blood from the atmosphere. As the blood feeds upon oxygen and consumes more when the body is in active movement, it is necessary that the heart be large and strong to receive and send the blood in large quantities to its airing or feeding ground, the lungs; also that the lungs be large to receive both it, also the air from without, which has to meet the blood and deliver up most of its oxygen to the blood, and in return receive impurities from the blood and carry them from the lungs. Besides being large and strong, the heart and lungs have to submit to quickened rhythmical movement during the exercise of speed and power, therefore we have to see that the walls of the chest, which we saw were formed by the ribs, are freely *moveable.*

71.—The belly contains the organs for the conversion of food into the substantial elements for repair of the waste of tissue which the body is always undergoing, but which goes on more quickly when the animal is in greater activity. These organs are for the most part, the stomach and intestines with the largest gland of the body, namely, the liver.

The stomach of the horse is comparatively small, but the intestines are very large, and are of necessity *kept distended by residual gas*, which it is one of the functions of the healthy body to keep *evenly balanced* in regard both to quantity and quality. This constant distension of the intestines by healthy gas causes that roundness and tension of the belly we see so well marked. When the horse is in hard condition, there is a minimum quantity of healthy gas in the bowels. This can only be when he is living on highly nutritious diet in a concentrated form, such as oats and hay. Should an animal, as in summer, be living on less nutritious diet, and this engulphed in coarse watery non-nutritive material, causing the digestive apparatus much work, then this residual gas is for the time greatly increased, whilst the powers are taxed to their utmost, and it not unfrequently happens that these fail in balancing the quantity of this gas, and so 'windy colic' results. It is then for us to ask first of all what the horse we are purchasing is living upon. If it is green food, we expect to find a larger belly than when living upon harder and more concentrated food. When the gas in the bowels is much less than common, it gives to the animal an unsightly appearance, and he is said to be 'tucked up in his flanks;' but I must caution you here against being deceived in the import of this. If a horse is pained in moving his hind legs, he will be tucked up in the flanks on the side on which the lame leg is, and tucked up on both flanks of course, if lame on both hind legs. In this case, the gas in the bowels may not be proportionately less, unless he is otherwise in bad health, but it is more compressed and pushed forwards, and encroaches upon his breathing area. Some horses have habitually an appearance of less residual gas in their bowels even when in health. This gives their belly an unsightly tucked up appearance, but it is not in itself a blemish. It will occur from overwork and is one of the best indications we can have to stop off work, or moderate it; because, as we have reason to know, this gas must be present in sufficient quantity to maintain the digestive apparatus, so that it is merely pressed out of its legitimate area by the over-worked abdominal muscles, and presses upon the heart and lungs which causes these organs to work under undue pressure from the rear, and which will almost invariably end in inflammation (pleurisy) of their serous covering, called the pleura, if not stopped; because the pleura invests the lungs, and turns again upon itself and lines the ribs, and during breathing the two pleuras have to rub over each other, and if the lungs are unduly pressed upon from behind this friction increases and leads to inflammation.

72.—The trunk at the top has the back bone running its whole length, and we saw that each bone of the back had a bone sticking up called its spine. We further saw that it was the great length of these spines in the fore part of the back which mainly constituted the withers. The spines of the back are not all the same length, but require to be long, in order that the horse may have a strong back. The ribs must be long, so as to give depth to the chest, and they must be well rounded, otherwise the horse will be what is termed flatsided. This condition limits the extension of the lungs from side to side, so they have to extend backwards and encroach upon the alimentary organs, more especially the stomach, and this renders the animal less strong than he otherwise would be.

73.—The bottom of the chest at the girth place and between the fore legs is clothed by the very large 'pectoral' muscles, which in horses used for great speed are very highly developed, so as to give this part a very deep appearance. When these muscles are large and the withers high, the fore part of the trunk is very deep.

On referring to the horses depicted in Fig. 10, which represents our two extremes—speed and strength—it will be seen that in horses used for speed the chest is very large, and with the large powerful muscles gives the fore hand its massive appearance; while the belly is very small indeed. This gives to the trunk its *downwards and forwards axis*, as seen by our line. The draught horse on the other hand, has, if anything, the chest smaller than the belly, so that there the two cavities are more of a size, hence the almost horizontal axis of the trunk.

LESSON VIII.

THE HIND EXTREMITIES.

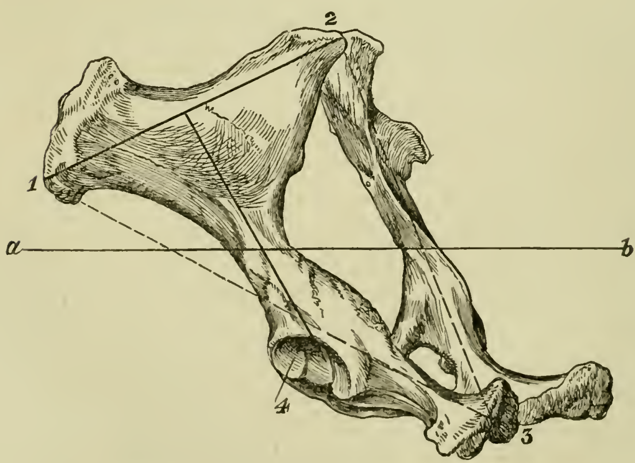
Named from above downwards the bones of the hind extremities are:

The Innominate Bones.
Femur.
Patellas.
Tibia.
Fibula.
Tarsal Bones.
Metatarsal Bones.
Two Sessamoids.
Suffraginal Bone.
Coronal ,,
Navicular Bone.
Pedal or Coffin Bone.

74.—The 'innominate,' or nameless bone, is so called on account of its being like nothing but itself to which anatomists can compare it. It is scientifically termed the 'pelvic girdle.' The word *pelvis* means a basin, and, save in mankind with his upright trunk, scarcely applicable to the lower animals, seeing that it is neither shaped like a basin nor properly acts as such in them. A very small portion of it called the true pelvis assumes more of the character and functions of a basin, and holds and protects the bladder, unimpregnated womb, &c.

This bone in forming the foundation of what are called the 'hind quarters' must be *thoroughly mastered* in all its aspects here pointed out.

FIG. 11.



The bone is made up of two *symmetrical* halves,* each half being made up of three distinct bones which become inseparably united in adult life at their lower middle portion. These are called 'ilium' 'ischium' 'pubis.' We find the 'ilium' making up by far the largest part of the bone, and is all the part in front of the joint, and on which we have placed the T shaped figure. It also helps to form a part of the cavity of the joint. The 'ischium' is all the part behind the joint from 4 to 3. It also helps to form the joint. The 'pubis' is not well seen in our figure but is a small flat part which with its fellow unites the two halves of the bones together. It concerns us here so little that we shall not further notice it.

75.—The 'ilium' is irregularly T shaped. The two ends of the *top* of the T are rough and prominent, the external end at 1 more especially so, and is that 'point' in Mark Twain's horse which he hired in the Sandwich Islands, situated behind the saddle on which he hung his hat. The other end of the T at 2 is also rough, but not nearly so prominent, yet it too is conspicuous in some horses. This *top* of the T is flat and very broad and concave from one end of the top of the T to the other. As it approaches the joint it becomes narrow and nearly round like a long bone, and like a long bone widens out to help to form the joint.

76.—The 'ischium' part of bone (between 4 and 3) is seen to be quite like a long bone in its

* Our description applies to either half.

centre in being round and narrow, and widens out in front to help to form the joint, and also widens out behind, and forms a large rough prominence, 3, we see by the side of the root of the tail.

77.—The 'ilium,' and 'ischium' being practically all one bone, we will refer to them as such, and call the *united structure* the '*ilio-ischium.*' The ilio-ischium plays the most important part in the formation of the hind quarters as we shall see. We have seen that it has three points all large and rough, and which give origin to large muscles. Now we find these points extremely useful, indeed *indispensable landmarks* in judging the hind quarters. If point 1 be placed high up on a level with point 2, it gives the hips a rugged coarse appearance, as in Fig. 12, the large rugged point being all the more conspicuous. Then again if point 3 be placed very low down, it gives the quarters a drooping appearance therefore we have to regard the relations of these three points to *two axes*, one axis is the long axis of the body generally, and may be represented by the line *a b*, which we shall call the axis of the *antero-posterior obliquity;* the other axis is represented by the dotted line between points 2 and 3 which we shall call the axis of the *lateral obliquity.*

Seeing that point 2 is fixed always, being bound down by unyielding ligaments to the solid portion of the back bone, called the *sacrum*, and the sacrum is as we have seen a part of, and a continuation of the back bone, it follows that when this *ilio-*

ischium alters its relation to the line *a b* (axis of antero-posterior obliquity) it is the point 3 which is affected and lifted up so as to form straight quarters as in the Arab; drooping quarters as in the cob and trotting horse, or a medium as in the hunter class.

Again, when the lateral obliquity is affected we may regard the points 2 and 3 as being fixed, or what is better, regard the dotted line 2, 3 as a door

FIG. 12.

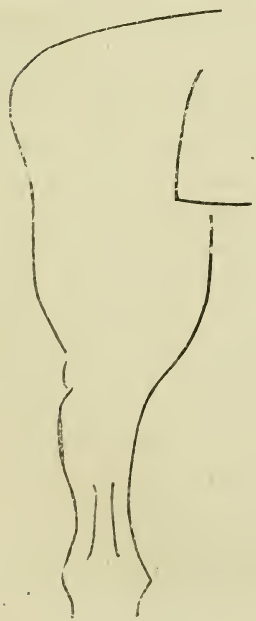
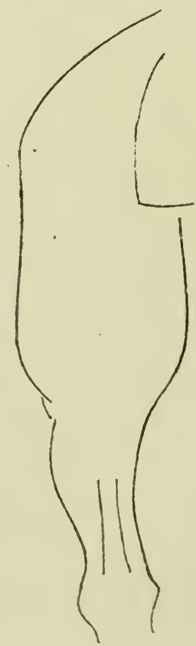


FIG. 13.



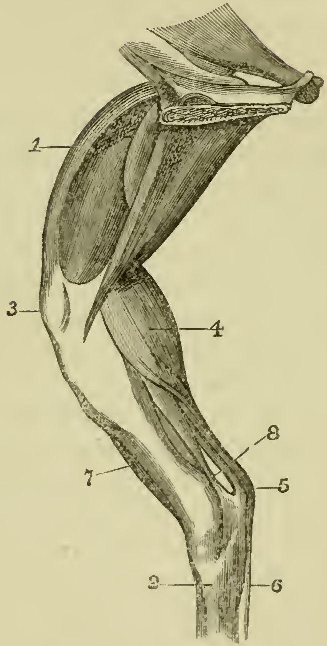
post on which the bone *ilio ischium* is swung, then it is evident that it is the point 1, and with it the joint 4 that is affected, the former most so, and we get the *level ragged hips* well seen in the 'bus horse, where the point 1 is on a level with point 2, and where the widest part of the quarters is at the top (Fig. 12), or we have point 1 much lowered as in Fig. 13 seen in the higher breeds, where the breadth of the quarters is much lower down. Notice of course that as it is point 1 which determines the breadth of the quarters in all cases, the quarters will be widest at the top or lower down according to the relative position of point 1, to the axis of the lateral obliquity (dotted line 2, 3).

The hip joint is *largely affected* by both obliquities. It will be highest in straight quarters, and lowest in drooping quarters. The length of the thigh bone is the same in all positions of the joint so that the stifle joint will be lowest and furthest advanced under the body in drooping quarters. This condition is most favourable for fast walking and trotting, but little favourable for galloping, because the more the quarters droop, the more is the femur or thigh bone directed forwards and downwards, and having a limited motion, and placed almost at right angles with the ilio-ischium, its movement backwards is therefore less, and incapable of being stretched well back in the gallop. The femur is placed at right angles, or nearly so, with the ilio-ischium, so that its arc of motion will be the further advanced the more drooping the quarters.

To judge the length of the femur in the living horse, you draw an imaginary line from the prominence at the tail to point 1, then the head or top of the femur is at the end of the first third of this distance, and the other end is quite well represented by the depression or notch, formed at the stifle joint. The femur is a very thick bone, and very powerful, and clothed by the large muscles of the thigh. It extends from the socket on the ilio-ischium, whilst the lower end is placed upon the two bones below (tibia and fibula) with the patella or knee-cap in front, and thus forms the *largest* joint in the body called the stifle joint (our knee joint.)

78.—One bone only, the tibia, reaches from the stifle joint to the hock joint (See Fig. 14). It is a long bone with two ends. The upper end as aforesaid helps to form the stifle joint, and is rather a large end. The lower end is *small*, and with the astragalus forms the true hock joint. The length or shaft of the bone is not round, but *has three flat sides*; one side looking backwards having upon it the bellies of large muscles corresponding to the *calf* of our own leg. Another surface looks inwards and forwards, and is covered by skin only, as seen in Fig. 14, just as in ourselves, and in us is called the shin, and can be felt as a bony surface from our stifle or knee down to our hock or ankle, where it ends in a *very sharp bony point* in both cases called

FIG 14.



1. The large muscles of the thigh.

2. The lower part of the hock at the usual seat of spavin.

3. The patella, or "knee-cap," immediately below this the depression is over the joint.

4. Muscles at the back of the tibia, corresponding to the "calf" of our leg.

5. Point of hock.

6. Curb place.

7. Bellies of muscles on outer aspect of leg.

8. Space, the seat of "thoro-pin."

the *inner maleolus.* Make an effort to remember this prominent bony point called the *inner maleolus,* because it forms a prominent land-mark in describing the hock. The remaining side of this bone looks outwards and forwards, and is covered by powerful muscles, Fig. 14, 7, which if you grasp your right leg with your right hand in front, half way between the knee and ankle, and then raise your toes without moving your foot or leg you will feel to contract. This outer surface then is covered by the bellies of the muscles which lift the toes upwards, and in the horse lifts his foot forward. We have spoken of an *inner maleolus,* implying the existence of an outer maleolus. The outer maleolus is formed by the lower end of the 'fibula' in ourselves, but in the horse the 'fibula' is only rudimentary, and does not reach down to the hock, or ankle, but is merely a spicula of bone having no function or use whatever.

79.—The hock* (our ankle) is a highly important joint on account of the frequency of its break-downs. It is placed *under*, and forms an *angle* with the large bone, the tibia, which transmits the weight of the body on its upper surface, and is placed over, and is in a *line* with the long bone below, the metatarsal bone, which has to meet the weight of the body at this point, and form a support for it every time the body has to be propelled forward. We must never lose sight of the fact that *the angle is at*

* The student should procure the bones of a sound hock. Any horse-slaughterer's man will procure and prepare these for a shilling or so.

the bottom of the tibia, and at the *top* of the hock, and that the direction of the weight of the body is represented by the long axis of the tibia. This direction of weight is easiest combated the less the angle formed at the hock, just as a straight upright pillar will bear a greater weight than one which has a bend or angle in it, and the greater this bend or angle, the less able is the pillar to support weight put upon it. The weight of the horse is, we have said, transmitted through the tibia, and is not a *dead* weight so to speak, that is to say it is not like the steady downward pressure of a weight having no other influences save gravity on the one hand and the resisting medium on which it rests on the other. It may be compared to the pressure exerted on the end of the village urchin's bow when he has planted one end on the ground, is bending the wood with his right knee whilst he holds the bow firmly pressed to the ground with his left hand, and is dragging the string upwards to the notch or catch with his right hand. In such a case the end resting on the ground is pressed downwards with the left hand, and is dragged upwards through the medium of the string with the other. Such a weight differs much from a so called dead weight. Excluding the long bones above and below which meet the hock, and regarding only the intrinsic bones of hock, we can divide them into three sets according to their functions; namely—

1. The gliding bone.

2. The lever bone.
3. The buffer bones.

The gliding bone is called the astragalus, and is a large cubical block which carries the two *large* gliding surfaces, on which glides the *small* end of the tibia. These two large gliding surfaces have a screw-like form which causes the parts below the hock, when the toe is lifted, to move outwards. Then again this gliding surface is almost parallel with the long axis of the hock and parts below. Then again, and this is very important to remember, when the foot is on the ground, the leg at its straightest, and the very *small* end of the tibia resting upon the *top* of this large gliding surface the hock appears large, but when the leg is lifted, and the *small* end of the tibia slides necessarily to the bottom of this large gliding surface, the hock *looks small*, therefore it is the relation of this large gliding surface to the *small* surface at the lower end of the tibia which determines the apparent size of the hock. *It follows that a bent hock which appears smaller may be as large as a straight hock which appears larger.*

The lever bone or 'calcaneum,' is placed at the top of the hock at the back, and is a lever of the second order. The end of the long arm of this lever is called the point of the hock, and corresponds with our heel. It has attached to it the tendon (called 'Tendo Achilles') of the large muscle whose belly forms the so called calf of our leg. All depends upon the length of this lever whether the 'calves' are large or small because the longer this long arm, the less will be the strength required to work it. Niggers have small calves to their legs very often, because their heels are so long. A well bred European with his short heels (arm of lever) requires a powerful, *ergo* large, muscle to *work* it, and so can boast of 'having a good leg.' The 'calf' of the horse is very much concealed on account

FIG. 15.

of the large muscles of the back of the thigh being inserted into the back and upper third of the tibia surrounding the 'calf' to some extent. The muscles on the outer side of the tibia (Fig. 14, 7) called the *gaskin* muscles well seen in Fig. 15 are extremely prominent, and measureable with the eye, and as we have seen, extend the toe and foot. Little notice then need be taken of the long arm of the lever under consideration. With a long lever arm, and the same bulk and strength of 'calf' required for a short lever arm attached to it the hock would be torn asunder. This, as we have seen, cannot be the case. The weight surface of the lever is applied against the astragalus. The fulcrum concerns us most, as it is fixed by means of ligaments which are some times torn or otherwise injured, and which swell and inflame in consequence, and the horse is then said to have 'sprung a curb.' The place of this occurrence is marked at Fig. 14, 6.

The 'irregular' bones or buffers are placed at the lower part of the hock, and are two tiers having joints between them. They are very much jarred when the hock is flexed smartly as in that quick fascinating hock action we sometimes witness, and then the inner ones undergo change and throw out a soft plastic material which in time hardens into bone, and is called 'bone spavin' or a 'jack.' Much depends on the size of these buffer bones .If they are large they serve their purpose, and we may have a good hock. They form the whole of the lower part of the hock so that we must look for this part to be large in every way.

80.—The bone below the hock is called the metatarsal bone, and is like the metacarpal bone of the fore leg only it must be thickest from before backwards.

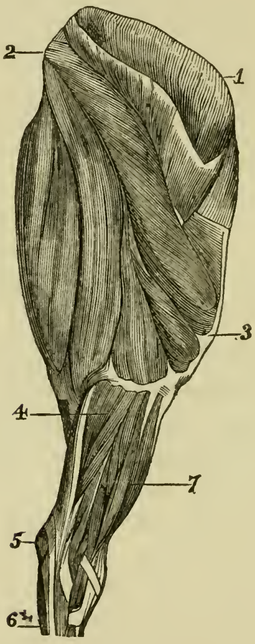
81.—The remaining bones are for the most part like those of the fore leg.

LESSON IX.

HIND EXTREMITIES, *continued.*

THE hind extremities are the *propellers* of the body, and the fore extremities are the weight bearers roughly speaking. The same general remarks which were made regarding the fore extremities apply equally to the hind ones. The ilio-ischium representing the scapula, &c. Where we find the bellies of groups of muscles, there we find bulk and rotundity. Those who have an eye for the beauty of curves will find pleasing curved lines in the outlines of a horse in condition. The absence of these beautiful curves is well marked in horses not in condition. For example, standing at the side, but a little behind a hunter in condition (*see* Fig. 15), we see prominently among other curved lines the most beautiful curves formed by the outlines of the muscles of the hind-quarters and leg; indeed to all, whether judges or lovers of horse flesh or not, this profusion of elegant and varying curves set forth on

FIG. 16.



1. Outer point of ilium.
2. Point of ischium.
3. Stifle joint.
4. Calf of leg.
5. Point of hock.
6. Curb place.
7. Gaskins.

a shining coat, grace of movement and the fire of excess of life, gives a thrill of pleasure which possibly no object in nature can surpass. These beauties are not surpassed by the most perfect female (human) figure, and seeing that in our social life these latter are hidden, undoubtedly a hunter in highest condition, prepared for the chase, is perhaps the most entrancing of sights. Look out then in judging a horse for beautiful curves. There are some—but they must be first rate judges—who can afford to lose sight of these curves in purchasing what they term a poor horse, *i.e.*, a horse not in condition. When this is so, they must see to the *relative length and bulk* of the levers (bones) being what is desirable, also that the joints are *large* and *flat*, and of course an absence of blemishes. If the bones of the extremities are of proper length and stoutness, then—except of course in disease—the muscles will either be in good condition, or will be capable of being made so, and they will be massive and present bold beautiful curved outlines.

The ilio-ischium should be broad so as to present abundant surface for muscular attachment. If the T shaped upper surface looks upwards from the quarters being 'ragged' from point 1 (Fig. 11), being on a level with point 2, then the body of muscles occupying this space will present a curve with a convexity looking directly upwards (*see* Fig. 12). But should point 1 be much lower, the convexity of the curve looks outwards and upwards (*see* Fig. 13), and the curve formed—as seen when standing behind—in the latter case between point 1 and the stifle joint will be less broken, and therefore the more elegant.

The depth of the thigh is well seen from behind, but it appears deeper, if not really so, in such as have straight quarters for reasons we have before seen. There is just one other obliquity of the innominate bone which we have as yet not mentioned. It obtains between the two symmetrical halves of the innominate bone, in other words, between the two ilio-ischia bones. When these bones are much divergent in front and their after points converge, a very defective 'setting on' of the hind limbs results and the hind limbs look outwards. This being so, the hocks are closer together, and the horse is said to be 'cow hocked.' The ilio-ischia bones ought to be as parallel as possible, so that the hind limbs look straight forwards and backwards, when the horse is standing. In moving, the hip joint and the screw-like astragalus cause the limb naturally to assume the slightly outward aspect. In ourselves this is so, and the dancing master or drill serjeant is not to be thanked that our toes are a little out-turned, because as the hip joint is constituted, they could not be otherwise.

It is hoped that the above remarks will form a good guide to those who are desirous of *thinking out* for themselves the numberless points to be observed in horse judging.

We shall now close these remarks with a few observations on the hock.

THE HOCK.

82.—Of all the joints in the body this is the most important. We must refer the reader to our description of the bones in Lesson VIII, and remind him that according to the size of the individual bones alone the *apparent* size of the hock does not depend, but more upon the angle at which the tibia impinges upon the astragalus. This is well seen in extreme flexion, when the hock seems to disappear leaving nothing but its so called point in view. The lower fourth or more of the hock is made up of the buffer bones in front and at the sides, consequently it is these which give the lower part of the hock size. They must be large but not necessarily coarse, but they may be large and coarse and of unequal size in the two hocks and yet be quite healthy and free from 'spavin.' The top of the metatarsal bone on which they mainly rest must also be large. When this latter is small we have a grave defect; but when it is not only small, but forms with the buffer bones of the hock an angle, we have a very grave defect called 'curby hocks.'

The hock should present on its inner surface a *big, flat, square* appearance, and when a horseman speaks of liking a big, flat, square hock, he refers to the inner aspect of the hock. The boundaries of this so-called square are as follows: the internal maleolus or lowest inner point of the tibia; the extreme point of the hock; the front part of the head of the tibia; lastly, the head of the small inner metatarsal bone. These points form the four points of the square, and the sides are the imaginary lines between these four points. The reader will find further information about the hock in my work entitled "Lectures on the Examination of Horses as to Soundness." It is not within the scope of the present work to speak of morbid conditions—such as spavin, curb, ringbone, splint, and so forth, which is better left to the work referred to, but we must caution the reader against an appearance of 'curb.' When the head of the outer small metatarsal bone is large, it gives the side aspect of the really good well made hock a 'curbed' appearance, because the line from the extreme point of hock to the fetlock at the back should be *quite straight*, and is straight in all except badly formed hocks and such as have 'curbs.' Even when the head of the outer small bone named is large and breaks this line when viewed from the side, the straight line is still found when you approach the hock and run your fingers down the middle line of the parts behind.

The angle at the hock we saw was formed by the tibia impinging upon the astragalus, and we further saw that the less this angle, the weaker the hock. The hind legs must therefore be as upright, or rather as straight as possible, in order to be as strong as possible. But we have already seen that power (strength) is universally gained at the expense of speed, which, in turn, can only be obtained by quickness and extent of motion of the parts most concerned in speed, so that straight hind limbs are stronger but have less of that quick perfect flexion or hock action which has such an attractive appearance.

The front and back of the hock must also have plenty of breadth. The point of the hock short of being 'capped' cannot be too broad.

83.—The metatarsal bone must be short and stout, and the hock as near the ground as possible. This bone is thickest from before backwards, and as the back tendon must have the same characters as we described in the case of the like structure in the fore limb, it follows that these parts will be altogether deeper from before backwards. As in the case of the fore limb, the tendon must stand out distinctly from the bone, and the suspensory ligament be well defined.

84.—The pasterns must also have much the same qualities as those of the fore limb in each class of horse.

85.—The foot also must have the same general characters as the fore foot, but the long axis of its oval is always from before backwards. The hind foot does not call forth the fraction of the amount of care as is the case with the fore foot. It is less often unsound, and its unsoundness less frequently leads to the same disastrous results. It is well however to look to it much in the same manner as in the case of the fore foot.

LESSON X.

THE WIND, COLOUR, HEIGHT, COAT AND HAIR, AGE.

THE term 'wind' is used by horsemen to signify the respiration or breathing capabilities. It is no part of my object here to describe defects in the 'wind,' and how to detect them. This is done in my work entitled "Lectures on the Examination of Horses as to Soundness" so that only normal or healthy breathing, or 'wind,' will here be described.

When a healthy horse of average size is standing quietly in his stable, he breathes from eight to ten or twelve times a minute. I here use the term breathes in its popular sense, which all, I believe, understand. If the back of the hand and fingers be placed against the ribs, just behind the elbow, the heart will be felt to knock the side in beating about four times the breathing rate, so that a healthy horse having a pulse of thirty-six per minute will breathe about nine times per minute. In all cases there ought to be this ratio 1—4 or thereabout. Should this ratio be absent to any marked extent, such for instance as a breathing rate of fifteen, and a pulse rate of forty, disease is present. Exercise in moderation increases both pulse and respiration, both are quickened, but the ratio is more or less retained. Anyhow, when the horse comes to stand and rest, the ratio in health is soon re-established. In very small horses, such as Shetland ponies, the pulse may be forty or forty-four per minute, and the breathing eleven, but there is still the ratio 1—4 in health. Many things disturb this ratio, disease, fright, grief, joy, &c., by quickening the pulse, and affecting less the breathing.

In order to acquire dexterity in judging the 'wind' it is best to get a horse known to have perfect 'wind' into a grass field, and have him slowly trotted round you in a circle about the size of an ordinary horse-rider's circus. Noise must *necessarily* be made in breathing, but there ought to be no distress exhibited, no difficulty in getting breath, no noises except soft blowing—no whistling or grunting. After a reasonable time, long before the animal shows signs of distress, he should be stopped, and notice be taken *how long* the breathing is in quieting down. This time is easily judged if the examiner will judge the horse by himself—if healthy —as the same length of time is required after the same proportion of exertion in the two cases. In the autumn when the horse has on a long coat he will feel distress earlier, and congestion of the lungs will be more easily induced. If exercise be not followed by quieted respiration some defect is present. Of course if undue exercise has been taken, then the lungs, although healthy, may have become congested. Again, attention should be given to the movements of the ribs on either side. The ribs should expand freely on both sides. In some diseases of the lungs one may become 'deaf,' or a great part of one may be so, then the work is thrown on to the sound lung, and the breathing capabilities so much decreased. This shows itself by the affected side having more limited movement. As a general thing, fat, gross subjects have a diminished breathing capacity, therefore they are sooner distressed, and their breathing does not quiet down so soon after exertion. Pregnancy encroaches still more on the breathing capacities. Horses used to going out of a walking pace are more likely to have good breathing capacities than those used for slow work. With draught horses, pulling a load will give a better idea of breathing capabilities than any other exercise—care being taken that the collar fits well and does not bear on the wind pipe.

Some strike and threaten a horse up against a wall, or while standing in his stall with a stick. Such a proceeding does not try the 'wind,' but will in some cases elicit the peculiar grunt or roar in 'roarers,' and thus save further trial. Further than this the test is useless and misleading.

COLOUR.

There is an old saying that a good horse cannot be a bad colour. This, like most *sayings*, has a germ of truth in it. Were we to have a free choice, in all cases we should select our colour as follows: the best colour undoubtedly is dark brown, with black points; the next best colour is bay with black points. Light chestnuts are good; but dark chestnuts are objectionable, as it is notorious that after seven years old their fore feet are often contracted. Greys and whites are not bad colours. Black is a hardy colour, white stockings if they exist largely on the same horse are objectionable, especially if the absence of pigment or colouring matter extends to the horn of the feet. Of all colours, yellow or Cleveland bays, piebalds, and dark red chestnuts are the most objectionable. In the choice of a horse, however, the purchaser should ask himself the question;—does the horse's colour offend the eye? if not, and if the horse be otherwise desirable the colour ought not to be an obstacle.

HEIGHT.

Having regard to most speed, we should have the largest dimensions possible, and therefore the greatest height compatible with perfection in symmetry. The greatest power also requires the greatest bulk. A combination of speed and power, as exhibited in our type the hunter, has its highest expression in horses about fifteen and a half hands high; half a hand more or less being unessential.

THE SKIN AND ITS APPENDAGES.

The skin of the thoroughbred is extremely thin and delicate, and allows the veins to be seen through it, and is covered with fine hair. That of the draught horse is thick. That of the hunter, or power and speed representative, is a mean between the two extremes, and shows as clearly as most things whether the horse in question inclines to being well bred and thin skinned or the reverse.

Much mane and tail is a sign of low breeding. A slight silky mane, with or without a little wave in the hair, is a desirable thing. The same may be said of the tail.

AGE.

Horses, as a rule, are considered at their best at from five to ten years of age. Much depends on the age at which they are put to work. The author has in his mind's eye a case in which a gentleman used to break his horses at four, but did not begin to use them until eight. These horses, to the author's own knowledge, were at their prime from eight to twenty years of age.

As horses are now treated, their ages may be compared with that of man as follows :—

A horse at	5	equals a	man at	20
,,	10	,,	,,	40
,,	15	,,	,,	50
,,	20	,,	,,	60
,,	25	,,	,,	65
,,	30	,,	,,	70
,,	35	,,	,,	90
,,	40	,,	,,	105

This calculation supposes both subjects to be well treated, or, as the Americans would say, "having a good time of it."

This is just another point in which Government interference would be beneficial. Horses ought not to be required to work or earn a sixpence until five years old. Not that there are not employments in which they could participate without serious injury to themselves before that age, but because these employments are so scarce, and it would be so difficult to draw the line were it left to individual opinion on the subject as to be practically impossible to admit the exception with benefit.

THE SUMMERING OF HUNTERS.

PERHAPS of all subjects connected with fox hunting, speaking broadly, there is none on which opinion is less settled than the one relating to the management of the hunter during the interval which must necessarily elapse between one season ending and the commencement of the next. Nor is this to be wondered at when we come to consider the subject in all its bearings. We have to take an organism in high condition in April and replace it in high condition in October, to give rest to tissues which have been exercised to their utmost capacities throughout the "season," and to take judicious means in renovating such parts as have suffered unduly from the duties which have been required of them. We have said *judicious* means. Means are taken in all cases almost without exception, and were we to have to name the most frequent means, we should without hesitation point to the blister-pot and firing-iron. We will endeavour to point out as we go along how much these means are abused by showing in their true light the conditions which are usually considered as calling them forth. There can be no doubt that our present plan of summering hunters in boxes instead of out in the open, exposed to fierce heat, flies and vicissitudes of the weather is a step in the right direction; but let us see how far this is so, judged by the light of *our* day.

At the risk of being tedious we must begin at the very foundation of our subject, and first mention matters which seem to have little or no bearing on the case in hand.

First then we must bear in mind that horses, like all animals soever are, as bodies, made up of two sets of tissues—

1. Master tissues.
2. Servant tissues.

Then, again, we must remember that the only power in the universe which animals possess over matter is to move it from one place to another. Thus all that a horse can do is to move a part or the whole of himself from one place to another; or to move some matter outside himself—his rider for instance—from one place to another. This is a great idea, and if we grasp it thoroughly, all the rest of our reasoning is easy. We repeat, the only power we have over matter is to move it. Now about our two tissues. We have called them master and servant tissues, because the master tissues move the matter, and the servant tissues supply them with nourishment, and support them in their task. The master tissues are three :—

1. Bones
2. Muscles
3. Nerves ;

whilst the servant tissues are very numerous, and may be briefly stated to be all the parts of that complex apparatus which produces, maintains and keeps pure the blood. For example, and speaking widely, as here we can only do, to produce the blood, seeing that it is converted food, we must have a converting apparatus—lips to take it into the mouth ; teeth to grind it ; saliva to soften it, &c. ; a set of actions to swallow it ; a receptacle—the stomach—in which it can be turned over, kneaded and further mixed with fluid ; a set of actions carrying it into the intestines whence that part of it which is fit is taken by a set of carrying vessels from the intestines into the blood stream. This blood stream in order to nourish the master tissues has to be kept well supplied with drains principally four—viz. the kidneys, the skin, the lungs, and the bowels. These drains must always be open and properly "trapped." Let the blood stream get too full, the kidneys drain off a good deal of its watery bulk if it is cold weather, whilst the skin will do so in hot weather ; let the blood stream get impure by noxious gases, the lungs will be the drain through which these gases will escape, the skin and bowels assisting the lungs in their task, and so forth. There is just one other means by which the blood is drained of impurities in this way. The blood is an extremely complex fluid, and holds different forms of nourishment for different tissues. At the risk of appearing ridiculous we will say that it holds potatoes for the bone tissue; cabbage for the muscle tissue, cauliflower for the nerve tissue, and so forth; so that each tissue in taking from the blood what it requires to nourish itself acts as a drain, that is to say, it takes from the blood a substance which it requires, but which the other tissues do not require. If then any tissue fails to take from the blood that which the blood is holding for its special benefit then that tissue fails to act as a drain, and the blood is holding a substance which actually is an impurity—matter in the wrong place—and which, not being wanted, the blood stream has to rid itself of through one of the other drains we have mentioned. We will let the reader peep behind the curtain just a moment by hinting that the muscles in a hunter, resting in a box, are not requiring, and therefore not taking their "cabbage," and so the "cabbage" is an impurity in the blood which the blood has to rid itself of.

Resuming our line of thought we see what a complex mechanism our servant tissues really are, but which we can briefly and widely state to be made up of three parts, viz.:—

1. A supplying apparatus.
2. A containing apparatus.
3. Drains.

During the "season," both these tissues are taxed in the conditioned hunter to their utmost, whilst between "seasons" the master tissues are largely thrown—as an engineer would say—"out of gear." What a change! Can it be matter for surprise that so many mistakes are made in "throwing out of gear," and maintaining at "low pressure," such a complex machine, and then from "low pressure" restoring it again to that state which shall stand the highest pressure? Our surprise, when we come to think of it, is first that it can be done at all, and next that it is done so well. From the above consideration it will be seen that our subject has to be considered under four heads, viz.:—

1. Throwing the horse out of condition.

2. Maintaining and giving the most perfect rest to the whole organism whilst in this lowered condition.

3. Repairing and strengthening those parts of the master tissues which have "given way" during their highest use.

4. Restoring the organism from this lower to the highest condition.

We will now make a few remarks on the "master" tissues. These, as we have said, are three—bones, muscles and nerves. The bones form stout unyielding arms of levers; the muscles are the powers which move these arms of levers, and the nerves transmit the current which sets in motion the muscles. The bones form joints by expanding their substance at the part where the joint comes; then the ends of the bones which form a joint and which press upon each other are covered with a rubber-like substance called cartilage, which acts as a buffer, and lessens shock from concussion; then again, oil has to be supplied to lubricate the inner surfaces of the joints to prevent friction. The muscles, in getting attached to the bones which they have to move, have to do so by an intermediate substance called tendon, and, as muscles move bones by alternately lengthening and shortening the tendons have to glide up and down through sheaths which are lined by a surface which secretes oil or as it is called synovia. We see then that we have two sets of oiling apparatus—one set to oil the joints, and another set to oil the tendons. It is this apparatus which gets out of order so largely during the hunting season and gives trouble in the form of windgall, thorough-pin, bog-spavin, &c., all names for precisely the same condition, affecting the same structure, only at different parts of the animal machine.

We will now proceed to enumerate the four heads already mentioned :—

1.—*Throwing the Horse out of Condition.*—This is extremely easy to do, because the same qualities which enable a conditioned hunter "to go anywhere and do anything" enable him also to have an abrupt change in diet. Almost, though not quite, the same may be said regarding the housing or protection from atmospheric changes. It is evident, of course, that this cannot be done all at once without injury. The skin, which has been groomed and kept in a perfectly active state through many months, cannot be exposed to cold night air all at once without damaging the lungs and perhaps the bowels. The skin, we have before remarked, is an important "drain," which cold air and filth closes, and therefore its work has to be performed by one or other of the other drains—the lungs, for example; and as no organ can carry on its own duties and have the duties of another organ thrown upon it all at once without coming to grief more or less, therefore we find the lungs suffering when the body surface is suddenly exposed to unusual cold, and we have congestion of some parts of the air-passages or the lungs, or both, following such abrupt exposure, and cough at the very least resulting.

Of course, we are here dealing with the hunter that *has* to be put by, so to speak, for the summer. There can be no question that there is no gain in any other way in thus radically changing the whole constitution of the horse. If the condition could be maintained during the summer—that is to say, if one could afford to keep a heavy staff of grooms, and either exercise the horse oneself, or command the services of those who would apply just the proper amount of exercise, far short of course of the violent intermittent exercise of the hunting season—then, no doubt every other means would be most advantageously superseded. It must not be supposed that it is to the advantage of the "master" tissues to be thrown completely out of work. To take an extreme case: let a prizefighter, in training, put his healthy arm in a sling, and thus keep it motionless for six weeks, and then compare it with its fellow. See its diminished size, feel the flabby softened biceps. Muscles, so far from being benefited by being completely rested, are actually the worse for it. The individual fibrils, which in the multitude go to make up the muscles, not only shrink, but have a tendency to become degenerated into fat, and get removed by absorption into the blood-stream. The mean between these two extremes (hunting condition and idle rest) is, as one would know beforehand without much consideration, the best. During the season, the hunter's muscles have been in the habit of storing up vast quantities of energy, called by physiologists "muscular energy." The higher the condition of the muscle the more of this energy will it store up. The first expenditure of this stored up muscular energy, we may remark in passing, is intensely pleasurable, so that on first putting the muscles in motion—liberating the energy—in coming out of the stable, friskiness, which goes by the name of freshness, is displayed, uncontrollable in many cases, in spite of the better judgment of the subject of it. It is only healthy fibre which can store up this energy. Fibre largely degenerated into fat can store up next to none, and as we have said, the fibre may be altogether removed by absorption. Then a mean between these two extremes is found in doing whatsoever tends to keep the muscle fibre in its integrity, and in at least *some* tone. This integrity and this tone is quite easily kept at half-tone. This half-tone will not bear the storing-up process, accompanied as that process must be by full feeds of corn. If the muscle-fibre is not in full tone, it cannot take its *quantum* from the blood—it has not the power to do so; indeed it does not want it, and, as we have before pointed out, the blood gets loaded with the material it carries for the half-tone muscles, and which the half-tone muscles cannot drain out of it; and this material, in making its escape through the *other* drains, stimulates them, and so irritates them, as seen in the skin, in which it sets up an itching condition, especially at its most dependent parts at the hind heels. As muscle at half-tone requires less nourishment of a stimulating kind, it follows that the hunter when thrown into half-condition, will not bear nearly the quantity of hard corn, and is all the better for having his hay diluted with green meat one-third. Supposing, however, that it is not convenient to keep the hunter in gentle work and at half pressure through the summer, and he has to be shelved, this can be done as abruptly, or as gradually as is convenient.

2. *Maintaining and giving the most perfect rest to the whole organism whilst in a lowered condition.*—Long ago hunters were turned out gradually into the fields, there to pick up their own living; to be irritated and lashed into fury with the hot sun and flies by day, and to be pierced through and through in the cold, the rain, and dews during the night. Some have recourse to this practice still, but provide a shade to sleep in and to retire to from the sun and flies, and perhaps provide once a day an armful of hay and a feed of corn. We shall here stop to point out this as a very risky practice. When a horse is running out at grass he is very easily choked with oats. He gulps them down half masticated; the first mouthful passes into the stomach, but the next, after passing to the farthest end of the gullet nearest the stomach, sticks there, and the next mouthful is lodged on the one next before it, and so forth, until the gullet is crammed half way up the neck with the oats, and the horse, alarmed, seeks water and shows symptoms of choking. In such a case "not all the king's horses nor all the king's men" will do any good: probangs, drenches, æsophagotomy, all are of no service—death must result. Hay, however dry, has not quite such a choking tendency, yet it is by no means free from danger.

Another method of summering is to put the horse into large loose boxes, and keep him there apart from a field: to keep him in a box on tan, with clips on instead of shoes, to give him plenty of green meat, some hay and oats, and allow his skin to accumulate filth *ad lib.*, and in this plight to pepper at him with blister and firing-iron. This treatment, like turning him out to grass, as aforesaid, is also far from wise. We shall find good points in both these extreme forms, and we now propose to single them out and discuss their application. Our plan is a large loose box, a large field, scrupulous cleanliness, green meat, corn and hay, and perhaps *some* blister, *some* firing-iron.

Striking an average, fox hunting ceases in April, and the flies begin to cause annoyance in the latter part of June. From the middle of June to within a month of the commencement of the hunting season, one or other of the following sources of discomfort is present; we have either heat, dryness, and flies; or we have cold and wet. In any case a horse which has been used to a stable can find no kind of personal comfort in living constantly in the open air at this season.

We stated that the fox-hunting season ended about April, and that the flies began to cause annoyance in the latter part of June. We also stated that the horse in high condition could be abruptly thrown on a changed diet. Supposing a hunter has to be shelved for the summer, and thrown quite out of condition, there can be no doubt that a run at grass is not only desirable, but can be secured with a minimum amount of inconvenience from about the first week in May to the second week in June. The grass is sweet during this time, and the weather such as to be enjoyed by one who has been confined in a stable through the winter months. All repairs of parts where blistering and firing are needed should take place during this time, because the flies offer a great objection to these operations when they begin to tease, as they invariably find a "raw" place about an animal if there be one. At the end of the hunting season the owner of a well-ordered stud calls in the most experienced veterinary surgeon he knows. In these days of railway travelling distance goes for little. A careful examination of a hunting stud after a hard season by an experienced veterinary surgeon is simply priceless to the hunting-man. At this time the horses are carefully gone over, and notes made of their requirements. It may be that some serious patching has had to be done during the winter to keep the horses going. Now has come the time for the patches to be mended or the horse cast aside. The parts which have to receive attention at skilled hands are those parts—the limbs—which have been put to the most exertion throughout the season, and if we circumscribe this area further we shall find that it is the greasing or lubricating apparatus and the bones which have to receive curative attention. The bones have, perhaps, given trouble in the form of exostoses, each exostosis receiving a name according to its situation—"spavin" on the hock;

"splint" on the metacarpals; "ring-bones" on the pastern bones—especially the hind pasterns, and so forth. All these are just one form of disease—exostosis—and require much the same treatment. Ring-bones should be fired. Spavins and splints should be either fired, or punched and blistered. There can be no doubt that when the exostosis occupies a limited area, punching and blistering, or setoning, answers the purpose better than firing. In the case of a splint, for example, which may cause dead lameness whilst forming, but which passes off when the exostosis is matured—in six weeks or so—the splint may be no larger than a half-walnut. Then to injure a large area of sound good skin for such a small surface is much like spreading a horse-rug over the back of a toy terrier. The punch in three or four blows punctures all the splint surface, and a blistered surface the size of a crown piece finishes the work—this of course together with rest. In the case of ring-bone the surface is two-thirds round the pastern and is too extensive by far for the punch. When spavins are forming and small, the punch deals with them as effectually as the firing-iron. Should any of the bones require such measures as these, now is the time to perform the operation, and by the time the patients are fit to leave their sick-boxes some warm weather will have come, and the horse's skin will have become used to atmospheric changes with being at the open doors of his box throughout the days and nights of his confinement.

The diseases of the lubricating apparatus are for the most part all one disease, going by different names according to the part of the lubricating apparatus affected. It becomes affected by having more to do than it can bear. The extra work stimulates the surfaces which produce the oil, and being constantly overstimulated they pour out more oil than in health, and their sub-surfaces become thickened and hardened. Oil or synovia is poured out by these surfaces, and after being used a little is absorbed again by them—the old oil is changed for fresh oil. This is in the healthy state. In the overworked state the oil is thrown out but not again absorbed, at least not at the same rate as it is thrown out; then we have two conditions as a result:—

1. The parts become distended (thorough pin, windgall, &c.), and the old oil undergoes change; the most observable change is that of being more thick and solid, and, of course, less useful as oil. With these lubricating surfaces there are two well-marked stages of the disorder we have endeavoured to define. The first stage is that in which the parts being overworked return to their natural state with a night's rest. This is well seen in the forelegs. Perhaps a horse comes in with his back tendons hot and swollen, and a night's rest, with or without cold wet bandages, "fetches them down." The other stage is what we may call the permanently enlarged state. Here the horse always, and under all circumstances, has a "thorough-pin" or a "windgall." It

is evident that each stage must need different treatment. The first stage points unmistakably to less work or the suspension of all work for a time, and if this be not noticed and cared for it always ends in the second stage, where no amount of rest will take away the condition. It forms an excellent beacon, and points to less weight or a shorter " spell " being required; and they are wise who interpret its meaning. Frequently it happens that this state of things will go on for many months before permanent enlargements obtain; but all this time—the warning not being heeded—the secreting surface is getting ready for the overwork which it, as a secreting surface, has to face; it thickens and accommodates itself to its task like the skin of a blacksmith's hand. In thickening, the surface loses the nice balance it has held in throwing out new oil and absorbing it after it has become old and unfit, and then the firing-iron is set to work to compel absorption of the stationary, thickened, half-useless oil. Supposing that we have been foolish enough to bring about thorough-pin, windgall, &c., then we have to face hard facts: we have to bring ourselves to believe that not any means we yet know of will do for us what the healthy membrane used to do. All that the firing-iron, or the blister, or the mercurial ointment can do is to cause a splutter of vitality in the part, by which the absorbents are for a time, but only for a time, quickened. These means lessen but do not remove entirely the enlargement, and, what is more, they do not give a fresh lease to the oil-secreting and oil-absorbing surface. These means, and the rest which accompanies them, may prevent the mischief getting worse, but that is all they can do. When the enlargements are of old standing and hard, they call for deep firing, blistering, and rest: when they are of long standing, but not hard, rest and blistering are the best, or rest and mercurializing. It is a common practice to apply mercury in the form of mercurial charge to these parts in this last condition. The charge is made up of mercurial ointment and pitch, and after being melted is spread on, and short tow or wool stuck over the parts. Cradles are put on, and the horse wears the charge for weeks, or until it peels off. A better way of applying mercury for the purpose we have indicated, that is, we repeat, when the parts are permanently enlarged and full but not hard, is the oleate of mercury. This is a preparation not at all well-known, being rather recent.

We will now say something more about this new preparation—the oleate of mercury—for use in wind-gall, thorough-pin and enlargements, with or without heat, in the greasing apparatus generally. We have said, new preparation. This is only correct so far as general surgery is concerned, for the oleate has been known and used for some few years in a select circle of the medical profession. We may say broadly that mercury in one preparation or another is used as a local application in old-standing (chronic) inflammation of any part anywhere, occurring at or near the surface of the body. When inflammation smoulders in a part week by week, or it may be month after month, some of the products of inflammation become solid more or less, and the part affected is then enlarged, thickened, and hardened. We said this of the surfaces which secrete the oil for the greasing apparatus when they are exposed for long to over-work. Mercury acts by breaking up the solid remains of inflammation and allowing the broken up particles to regain the blood-stream, and thus get carried away out of the body. Mercurial ointment has to be persistently rubbed in, but the oleate of mercury is only to be spread lightly over the parts with a brush, otherwise it might act as a blister or produce a crop of pustules on the skin. Mr. John Marshall, the eminent surgeon of University College Hospital, introduced the preparation to the medical profession, and he says, "the preparations are cleanly and economical, and have a much greater diffusibility or penetrating power than the old mercurial ointment, for they are absorbed by the skin with remarkable facility, and manifest the remedial effects with great promptitude."

The oleate of mercury can only be procured from the best chemists, but any chemist can procure it for a customer. There are three different strengths of it—a 5 per cent., a 10 per cent., and a 20 per cent. solution. The most useful for veterinary purposes is the 10 per cent. Fortunately, oleic acid will dissolve morphia—one active principle of opium—also, so that a still more valuable preparation for these enlargements we are speaking of is the "oleate of mercury and morphia," when there is heat in the part we wish to apply it to. The morphia should be present in the proportion of two grains to the drachm. Their mode of application is something like the following: Ten to thirty drops or more to be smeared over a part—a thorough-pin for example—night and morning for five or six days, and afterwards every other day until the parts are much reduced. Should there be inflammation in the part, and we are using the "oleate of mercury and morphia" we at once relieve pain and nervous irritability in the part and so arrest the process of inflammation with the morphia, whilst the mercury breaks up, as we have said, the thickened deposits, or, as Mr. Marshall puts it, "the mercury promotes the death and degeneration of the morbid products, and so facilitates their subsequent removal by absorption." Before going any further we must ask for a little patience from the reader, because there will be those who have little or no idea about the meaning of "absorption." We have before said that the blood is the great nourisher of the tissues of the body and that each tissue takes from the blood stream what it needs, and it also restores to the blood stream its old worn out tissue. This being so, the blood, which is everywhere contained in vessels, must quit those vessels—get out of them. This it does not do in its entirety, but only some parts of it leave the vessels. The parts of the blood which leave the blood-stream and saturate the tissues must, after a time, return to the blood-stream *within* the blood-vessels again. So that we have here two processes—the process of leaving the blood-vessels and the process of returning to the blood-vessels. There are three divisions of blood-vessels: (1) arteries which convey the blood in a compact stream; (2) capillaries, of less than hair-like minuteness, which are terminations of the arteries, and through which the blood *meanders;* and (3), veins or the blood-vessels which receive the blood after it has been permeating and saturating the tissues, and convey it back again to the heart. Now the blood escapes through the delicate walls of the capillary blood-vessels and finds its way into the blood-stream by a system of vessels called "absorbent vessels." When the blood leaves the capillaries for the tissues it is scarlet with oxygen and rich particles for the repair of the tissues; but when it finds its way through the absorbents into the veins it is dark purple almost—in other words, it has given up its oxygen and rich materials to the tissues, and the tissues have in return loaded it with their refuse.

Just one other point. The blood is propelled powerfully through the arteries of the body by the contraction of that powerful hollow muscle called the heart. Here is a force-pump that we can see, and we can measure the force of the flow of the blood through the vessels, but this force is almost spent by the time the blood gets to the fine capillaries, and, as we have said, can only *meander* through them, so that we have to look out for another force, because, when the blood or parts of it have left the blood-vessels (capillaries) it has to regain the blood-vessels (veins) again. As it leaves the capillaries the force that sent it there is spent, or nearly so, and it has yet to travel through and saturate the tissues, and to travel to the veins. These forces are for the most part two comparatively feeble ones—namely *suction* and *gravitation.* The absorbent vessels, or those channels which convey the used fluid from the tissues to the veins, are extremely delicate, and are supplied with valves at very frequent intervals, and these valves only open one way; the fluid can run along the vessel through and past the valves one way, but if it wants to return it shuts the valves down. Here, then, is a decided *aid* to our feeble forces. There are other slight aids also. Now how is *suction* brought about? Very simply in this way; when a muscle is at work the belly of the muscle, alternately shortens and lengthens; and, besides doing its special duty—moving the bones to which it is attached by its tendons—in alternately shortening and lengthening, it acts as a suction pump. Thus the fibres going to make up the muscle run like a bundle of rods parallel with one another, and the spaces or channels between them are occupied by the absorbent vessels.

When the muscle contracts, each fibre or rod shortens and thickens, and as the muscle relaxes and lengthens the fibres also relax and lengthen, so that the *channels between the fibres*, which we saw were occupied by the absorbent vessels, are alternately widened out and closely pressed in, and so a suction process is established. If a horse walks he lifts his foot perhaps, once a second, and therefore the muscles at the back of his leg—foreleg, for example—contract and lengthen once a second, or in other words, the suction pump acts once a second. To illustrate this suction process; in the fall of the year take a horse with "filled legs"—that is to say legs whose tissues are saturated with *fluid* from the blood vessels which has settled in his legs because he has been *standing still* in his stable, and this fluid, for reasons we shall explain, in the autumn has been unable to find its way back into the veins. This fluid in the "filled legs" is only acted upon by one force, gravity. Its weight causes it to settle to the lowest parts. But now put the suction force in operation by walking the horse out for half an hour and then see. He comes in with his legs "fine" once more. Some muscles besides the heart are always working from the animal's birth to his death—the diaphragm or midrif for example.

We shall not apologise for taking the reader *seemingly* so far away from the subject; first, because thousands of horses and cattle—aye, and human beings too—are yearly lost or ruined for want of the little physiological knowledge we have here attempted to convey; and, secondly, we could not have finished our subject satisfactorily, because our readers could not have been introduced to the *rationale* of exercising, blistering, firing, setoning, mercurializing, &c., without this knowledge.

In concluding what we have now to say about the use of mercury as an external application for disease of the lubricating apparatus, we again say that when a mild preparation is required, the *oleate* will be found to answer every purpose, and more efficiently than the common mercurial ointment.

The subject of firing we shall pass over just now, because it is almost indispensable to employ skilled assistance.

Blistering we shall say a few words about, because practical horsemen so frequently blister their horses without advice. What we have to say will not be exhaustive. A few hints will not come amiss here. First, as to the kind of blister. It was thought long ago that the Spanish blistering fly or cantharides was the best, if not the only reliable and good blister. For some years the biniodide of mercury has been largely used. This is little if at all inferior to the *fly* blister for any purpose, and in diseases such as windgall, thorough-pin, &c., some actually prefer the biniodide. We prefer it in these cases to the *fly* blister. It is soon made by adding one drachm of the biniodide of mercury to one ounce of common lard, which has had its salt washed out. In rubbing it in, less pieces of it are to be applied at one time, or it runs down the parts beneath, and "scalds" the hair off, and may blister also. In *all* blistering operations it is well to besmear the parts beneath with a little hog's lard before commencing, as it protects them. Especially is this desirable, indeed absolutely necessary, in blistering the back tendons of a leg. The heel should be first well larded, or blistering of it may be followed by painful results from two causes:— 1. The skin here is delicate and sensitive; 2. The skin here creases when the foot is flexed. To blister any skin that is liable to repeated creasing, such as that in hollow of heel, that behind the knee joint, is bad practice, and is likely to give trouble. The best "all-round ointment" we know is made by mixing ordinary *fly* blister with the biniodide or mercury blister, half and half, or perhaps one part of the latter to two parts of the former. *Fly* blister is bought ready made,—a practice which cannot be too strongly condemned. Many horses are blemished for life, and not a few killed outright by blistering with "fly" blister, as sold by many druggists at an enormous price, and mixed with all kinds of disastrously harmful ingredients, such as Venice turpentine, spirit of turpentine, euphorbium, corrosive sublimate, sulphuric acid, &c. Pure blister only should be used, and the horseman should either make it himself or get it made by a respectable chemist. It should contain no active ingredient whatever besides the cantharides. The best *fly* blister we know is that of the British Pharmacopœia. It makes a somewhat harder mass than most, which has this great advantage: in all blistering operations the hair has to be clipped off close to the skin of the part to be blistered, and the blister has to be rubbed in with the naked fingers for half or three-quarters of an hour, so that the fingers and the part rubbed get hot by rubbing, and the heat produced melts a softer blister, and enables it to run down over the parts beneath; whilst the harder blister we recommend is only softened by the heat, and enables the fingers to rub it well into the desired surface a very little at a time. A piece the size of a bean is large enough, which will not disappear before it has been rubbed ten minutes. The blister is made as follows:—

Take of cantharides in powder, 12 ozs. yellow wax and prepared suet, of each, 7½ ozs.; prepared lard, 6 ozs.; resin, 3 ozs. Liquefy the wax, suet, and lard together by a water-bath, and add the resin, previously melted; then introduce the cantharides, mix the whole thoroughly, and continue to stir the mixture while it is allowed to cool.

The above is a large quantity, but proportionately less can be made, or, what is better, the horseman can ask for the ointment as made according to the British Pharmacopœia, and as used by doctors. When blistered or fired, the horse should have his head tied up to the rack high, to prevent his getting his teeth to the irritated parts, for at least two days; all straw should be cleared away from his legs also, and he will afterwards have to wear cradles for a time, to prevent his biting the parts, as when they are healing, irritation (tickling) comes on. We must also warn the horseman of the extreme danger of blistering too large an area. Never more than two legs should be blistered at any one operation. Horses have been frequently killed by the irritation and fever set up by blistering three legs at a time, and few horses could survive having all four legs blistered at once. Of course we mean when the legs are each blistered extensively—the whole of the back sinews in each for example. An area the size of a thorough-pin might be blistered on all four legs at once. Fever is often to some extent set up by any blistering whatever, so that it is *always anticipated* by giving a purging ball at the time of blistering, which, of course, necessitates the horse's living on bran mashes for two or three days. It is best to give a bran mash the night before any operation which is so severe as to require physicing accompanying it. Besides the danger of death from irritation and fever, from blistering too large an area at one time, we have another danger in cantharides blister. When cantharides gets into the system by being given by the mouth as a medicine, or rubbed into the skin and taken into the system by the absorbents, they are apt to cause inflammation of the neck of the bladder, or inflammation of the small intestines. The former is discovered by restless shifting of the hind feet, and frequent voiding of small quantities of urine, and general disturbance. When the horseman discovers such an untoward result, he should *at once* send for his veterinary adviser, as the inflammation is so apt to quickly spread to the kidneys and produce death.

Parts after blistering and firing cannot be too carefully looked after, especially after firing. Fired parts are examined from time to time by the veterinarian who has operated ; not so with blistered parts. Blistered surfaces at the end of forty-eight hours should be fomented for an hour with very warm water, and the gluey discharge thus softened and cleared away. This should be repeated daily if necessary, and a little saltless hog's-lard or sweet oil rubbed upon the surface. The great secret of blistering or firing and leaving no blemish mainly consists in keeping the surface free from the discharge produced, and protecting the surface from the discharge in the intervals by smearing over it oil or pure lard. The discharge in either case is irritating to the part, and will *scald* off the hair it flows over. If "proud flesh" is allowed to remain, a roughened, thickened, hairless ridge remains along the path of iron, and the parts are unsightly afterwards.

Sometimes blister is used in a slightly different way. Sweating blister, as some call it, is another way of using cantharides blister or the biniodide ointment. A very little is smeared on every day, and a "scurf" produced, which is cleared away by washing as we have described, and a fresh application of the blister. This is really an excellent method, and deserves to be more extensively applied. It can be used during work, which is an advantage. The best "sweating" blister is made by warming, for two hours over a half-cold fire, some powdered cantharides in olive oil, one part of the former, by weight, to six of the latter. Strain away the spent flies through a piece of rag, and use the oil with a short stiff brush.

We must finish our remarks about blistering by saying that if a part is inflamed a severe blister does much harm; indeed, this is so if there is any extra heat in a part. A chronic inflammation and a *small* amount of extra heat is not incompatible with a little "sweating" blister.

After our remarks upon the treatment of the ailments affecting the lubricating apparatus, we cannot avoid saying a word about the practice of firing and blistering parts with a view to "strengthening" them. Many horsemen have pernicious ideas about these so-called strengthening remedies. For instance, if a horse has long oblique pasterns there is much strain upon his fetlock joint and on his back "sinews," as a necessary (mechanical) consequence, and the tendon, at its insertion into the sessamoid bones, which brace the fetlock joint behind, is apt to become injured, in which the sessamoid bones participate. As a consequence, the back of the fetlock and the lower third of the back "sinews" become permanently enlarged, and to reduce the enlargement and to strengthen (?) the part a firing iron is used. Perhaps the fellow leg, acting under the same mechanical difficulties precisely, has not become enlarged at all, but the owner instructs his veterinary adviser to fire this leg also at the time he is firing its enlarged fellow, with a view to strengthening it and prevent its giving way also. At the end of every hunting season this piece of idiocy is carried out in many a well-ordered stud. How far does firing *strengthen* a part? That firing *does* strengthen parts there can be no doubt, but it does not strengthen them in the sense many horsemen suppose. If a part is suffering from a low form of inflammation, it will not be so strong as if it were not so suffering. Firing will frequently check or abolish the inflammation; therefore it will strengthen the part, that is to say, it will remove a cause which was rendering a part weaker than it otherwise would be. Again, if a part has suffered injury, with or without inflammation, and the material supplied from the blood-vessels for the repair of the parts has been deficient in either quality or quantity, or both, and has not accomplished the repair, then firing, by rousing the blood-vessels of a part to increased exertion, will often thus accelerate the process of repair, and so strengthen the part. Once more; suppose a part has been injured and repaired, and the material for repair, thrown out from the blood-vessels always, has been in excess, and this overplus remaining in the repaired part is a source of weakness to the part, then firing, or blistering, or mercurialising will break up the extra material, and it will be removed by absorbtion—a process we have already explained—and so will strengthen the parts. If, again, the skin be deeply fired, it changes it physically in this way: the skin lies loose over a part, and can be pinched up; but if it is fired through, it adheres deeply and firmly to the parts over which it lies. From being yielding and elastic it is converted into a non-yielding tough covering, strongly bound down to the parts beneath, and acts as a bandage.

It will be seen by the foregoing remarks in what ways firing strengthens a part. Firing can never make a long pastern into a short one; so that in the instance we have named firing will do no further good than turning the skin into a bandage in support of the tendons which are overstrained. It may do much harm, however. When any part whatever works under a constant difficulty, processes are set up in the part which tend to repair, remove, or otherwise mitigate the effects of the difficulty, and we cannot be over-careful in our meddling with these processes. Experts alone can in most cases judge what is best to be done, or, we might rather have said, what is best not done. If a part has more work thrown upon it than it can well bear, it enlarges and strengthens ("hypertrophies," as the process is technically called), and thus gets over the difficulty. During the time that the enlarging process is going on, the part is more active within itself mainly in its blood supply, and this alone will make it warmer than common to the touch, and it requires some amount of skill to determine the presence or absence of inflammation. This more active state is not necessarily inflammation at all, but the boundary-line between it and the commencement of inflammation is so fine that it is often extremely difficult to determine that inflammation does or does not exist. When a part is enlarged (hypertrophied) from over-use, then cessation of the over-use is followed by lessening, in due course, of the enlargement. The thickened, horny skin of the blacksmith's hand becomes fine and delicate in a few weeks should he be laid up with illness or accident. The same may be said of his biceps. A noble lord once asked the writer to remove an enlargement on the outer side of a hunter's fetlock at the end of a season. On bringing the horse round in his stall it was seen that the toe was slightly in-turned, and that the shoe was causing the toe to be thus directed. Once shoeing set the bearing surface of the foot and shoe straight, and the enlargement in a month was no more. In this case, had it been in the writer's power to have removed this enlargement, the bearing surface below remaining the same, the fetlock might have given way altogether. Here was an extra stay put where an extra stay was needed. In our example of the enlarged back sinews, and fetlock from the mechanical disadvantages of too long pasterns, where actual change from injury has not taken place, by shortening the toe and lowering it, and bringing the heel of the shoe an inch or more further back, the enlargement will soon disappear—in a very few weeks. But a horse could not hunt with such a shoe, so that it is no use to remove a laudable, serviceable enlargement which stands in place of a condition we cannot call to our aid. In short, we ought never to attempt to remove an enlargement that is doing real service, unless we are in a position to exchange it for more desirable conditions, or, in other words, do not remove a stay unless you can alter the superstructure so that it does not require the stay, or unless you can supply a stay which will act as well as the one you remove.

We have already said that at the end of a hunting season the bones and joints and the lubricating apparatus are the parts which most frequently require treatment. Next to these we might have ventured to assert that the hypertrophies or enlargements about the pasterns, fetlocks, and back tendons are the most common defects which the hunting man has now to deal with. In most of these cases it will be found that the bearing surface of the foot has been defective, either from bad shoeing or neglect of shoeing. During the season the hunting man cannot be too careful in seeing that the fore feet especially are regularly shod, and noticing the *least deviation* of the aspects of the foot. In a few weeks after the proper bearings of a foot are altered, the part affected will show it by enlarging; thus, if the toe gets too long, the back of the fetlock will enlarge from the altered leverage setting the parts here at a disadvantage. A toe getting too short will have a tendency to tilt the pasterns up, and render the fetlock liable to sudden "knuckling over." Should the outside of a foot and shoe get worn too low, the weight is thrown on the outside of the fetlock, and this continuing an enlargement here will appear. Should the inside of the foot and shoe get too much worn, the inside of the fetlock will enlarge, and so forth. The firing-iron does no good applied to conditions such as we have last named, but it often gets the credit of it. If the horse is to be fired over an enlarged fetlock, before the operation his shoe is removed, and the foot is nicely dressed and the bearing surface of the foot *set square*. Then he has no shoes at all put on, or only thin plates, is fired, and placed in a loose box for a few weeks. Then the enlargement disappears entirely, and the firing (?) has done wonders. Perhaps, instead of firing, blistering is thought to be the best. Now what takes place? The shoes are not removed, the uneven bearing surface remains and maintains *the need* of the enlargements, consequently the blister has no effect. In all these cases of enlargements or hypertrophies the removal of the conditions which call them into being alone will remove them, and it is a positive misfortune for them, by any means, to be removed, unless we can make sure of providing an efficient substitute.

We are now, I hope, in a position to derive a very practical lesson from what has gone before. It is this: At the end of every hunting season, one month should be spent in quiet observation; the shoes should all be removed and exact square bearing surfaces for all the feet obtained (light level shoes or plates being put on), and all enlargements occurring from the knees and hocks downwards most carefully observed. Hundreds of horses are yearly needlessly cast and fired from want of this simple precaution.

Those who are following us in our consideration of this important subject will do well to read, mark, learn, and inwardly digest the conclusion we arrived at in regard to "stays" or hypertrophies, which are so apt to occur about the lower third of the legs from uneven bearing surface of the shoe and foot. We have recommended a month to be spent in quietly watching the behaviour of these enlargements during rest and ease, accompanied by a level foot surface. From the end of the hunting season to the commencement of the time when flies begin to be troublesome is the period we choose to do all repairs to the animal machine necessitating "raw" surfaces being produced,—firing, blistering, for example. This time is amply sufficient for a month's careful observation when the season ends by the middle of April, which all seasons ought to do. If an hypertrophy is seen to diminish a good deal, under the favourable conditions we have named, we may conclude that it has been caused by the want of these conditions—an uneven bearing surface of the foot—and that it *is* an hypertrophy and, being so, will *not* be removed by firing and blistering or any medicinal means whatever. Some enlargement may and possibly will remain after the prescribed period; but we must remember that in laying by a hunter for the summer the conditions of rest, &c., are continued.

We now come to the habitation and surroundings of the animal during the first half of the period, however spent, of summer. There can be no doubt that a large well-lighted loose-box is, if not essential, very desirable. Light is extremely desirable. It would be taking the reader further out of the way than we have taken him, to explain in a satisfactory manner the vast bearing sunlight—direct or reflected—has on those countless processes which are ever going on in the animal mechanism. If one visits the out-patient department of a hospital in a poor, densely-populated neighbourhood, the terrible results of too little sunlight are most striking. The pale face, the wasted form, the enlarged joints, and festering sores about the neck, indicating a state of things which vaguely goes under the name of scrofula or the "king's evil" is seen sitting on the waiting benches or languidly lying on the sickly mother's knee, waiting its turn, and listening for the glad call applied to it of "next," when it goes to receive the old, old order of "iron and cod liver oil." Of course deprivation of sunlight is only one of the many causes leading to this sad state of things, but it is one of the most important causes. Lime-wash is cheap, then why not give the hunter, and indeed every domestic animal the benefit of it, mixed with some cheap neutral tint if you like, but let him have plenty of good sunlight. Direct raws are disagreeable to any animal and should be avoided.

Free ventilation is another essential. We think the adjective *free* is here very expressive. The air in a loose box or in any enclosed space containing large lungs, as those of the horse or of man, should be free in the widest sense of the word. It should enter freely; move about in currents when in freely; and, have a free exit. The air must be kept moving without forming a draught. It is dealt with on the principle that cold air is heavier than warm air, and therefore tends to occupy a lower stratum of space. Acting on this well-known law, we admit air for ventilating purposes from below and let it out above. The detail we have not space even to give in skeleton form, but we may say, that as ventilation is of the greatest importance, the hunting man should see to it himself and employ an architect, unless of course, he employs a blacksmith or farrier to doctor his horses; then to be consistent and economical (?) he will employ the plumber or carpenter to direct and supply proper ventilation. The best treatise on the subject, should he find it desirable to refer to one, is Colonel Fitzwygram's "Horses and Stables."

The treading area is the next most important consideration. In all cases the feet should rest on a *soft* surface, because they are if not without shoes, at least only sparingly protected with iron in the form of plates. Spent tan is without doubt the best covering for the floor, but it ought not to be coarse, neither should it be allowed to remain on the ground an indefinite length of time. We must remember that we cannot remove the urine from it. The water of the urine may possibly get away by drainage or by evaporation, but the salts of the urine remain in it and are in time decomposed. It should neither be too dry nor at all swampy. If it be too dry, the feet get dry and brittle and will chip and split, but if too moist it is very apt to set up a stinking discharge in the cleft of the frog (thrush) which, being allowed to remain will surely wreck the frog, and, of course the back portion of the foot. The tannin remaining in spent bark is a capital astringent, and has a direct tendency to keep away "thrush," or to dry it up should it be present, but there may be too much tannin and wet from the bark as it comes direct from the pit. When this is so, a day or two's exposure to the sun will remove the extra moisture. Some mix sawdust with it, but this is quite unnecessary. Sawdust ought never to be used for horses to tread upon. It is too dry.

Straw too is not fit for our present purpose, at least it is not so good as tan.

The feet should be attended to all the time, as if the animal were doing his usual work; indeed, it is almost more necessary to attend to the feet during this long rest in a loose box because the horn grows faster, and is apt to disturb that equal bearing surface we have so much insisted upon. The toes get long and throw extra strain on the back sinews when the animal walks. We cannot refrain from telling a rather amusing story bearing on our last observation. We were once sent for a long distance (over a hundred miles) to see a young horse recently purchased, whose owner was laughed at by his friends for the high price he had given in purchase. This banter caused him to take such a dislike to the young horse that he put him into a loose box and did not go near him at all for five weeks. The horse was shoeless during this time, and the toes grew long, of course. The owner now had the horse brought out in a bridle. "Hallo! Stringhalt, by Jove! take him in John. Here is a nice thing. Bought the brute; done nothing with him but keep him quiet in loose box; first time bring him out, stringhalt. John! send for ———." We went and found the poor lame animal, for lame he was; his toes were a fearful length. Each time he set his feet down, his hind feet especially—he picked them up as though he were treading on hot bricks. This gave him a peculiar appearance, not unlike stringhalt. He was afraid to walk. Each time his foot was set down, the back sinews, of course, were unduly tightened and pained. We at once sent for a farrier who set his feet in good order. Now he was trotted, the stringhalt gradually disappeared, and he was all right. No stringhalt at least. We have said gradually disappeared; the horse trotted up and down for some minutes before he gained confidence in his new level bearings. At the end of a quarter of an hour he was walking and trotting quite sound to the horror of his chagrined owner. Of course the feet becoming ragged, chipped, and altogether out of order, is not the only disastrous result of want of attention to the feet during rest in a box, as we have before sufficiently explained.

Should thrush arise during the summering in the loose box, we must look to the tan or other matter on which the horse is treading, and see that it is in proper condition—especially that it is not too wet. We next endeavour to cure the thrush, which we shall find easy or otherwise, according to its cause. Thrush is frequently *constitutional.* When the horse has long legs this is most often the case, and cure is almost impossible, the discharge keeping up in spite of all that we can do, and usually wrecking the back part of the foot. Should, however, it be *local* in its cause, the cure is most easy. In this latter case we need only to clean out the frog by see-sawing very soft rope through its cleft, and introduce some calomel and stuff it down to the bottom of the cleft with tow or cotton wool. This should be done every morning for two or three mornings, when a cure may usually be looked for. Should heat and swelling of the leg arise on the thrush drying up, a dose of laxative medicine is called for. Next to too long toes and ragged feet, thrush is the most common ailment we have to look for whilst a horse is resting in a box. It frequently acts as a safety-valve to the over-fed system. When this is so, and we stop the discharge, we not unfrequently have affections of the air-passages, lungs, or bowels set up in its place. Simple as thrush appears to be—and if we judge it by the ease with which it is usually cured it does appear simple—we know of no ailment more urgently needing professional care than thrush, for many reasons.

The loose box which we are recommending as a summer residence to our hunter ought to be near a pasture to which he can betake himself at his pleasure. Under favourable conditions, most of which we have already hinted at, the hunter should be much in the pasture up to the end of June. The skin during this time ought to receive the most careful attention. Horse ponds are a nuisance in a summer pasture where a horse runs, as he is tempted to wade in and stand in the mud and water if the weather be at all hot, and this renders his skin filthy, besides the much greater evil of determining the blood to the bowels and lungs and the risk of inflammation thereby. Should flies tease, and two or three horses be running in the same pasture, a good deal of practical joking goes on, which too often ends in an ugly accident. The worse case of staking the writer ever saw was from this cause. Four horses were running in a pasture, and three of them, irritated by the heat and the flies, set upon the weakest and compelled him to leap into the next pasture. In doing so he alighted on his shoulder upon a stake and nearly severed his shoulder from his body. Most farmers know how frequent staking is in hot weather. It is mostly from the causes we have mentioned. Any water the horse is likely to get at in a field in summer, except under very exceptional circumstances, ought to be properly guarded, and instead of it, abundance of fresh water, or what is much to be preferred, fresh cold water with oatmeal stirred in, given at short intervals. Whilst on the subject of small cautions, we ought to point out the dangers a horse is at this time exposed to from small sharp projecting substances in door-posts, &c. We have seen odd posts standing here and there in a field, and old nails and crooks allowed to remain projecting from them when the field has contained some hundreds of pounds' worth of individuals fond of "larking" and rough play. Another small caution: when a loose box is open for a horse to run in and out from and to a field, the doorway should be a great height, and wide enough to admit two horses abreast, and the posts padded with straw or straw strapped round them. This latter precaution is extremely desirable, as horses frequently try to rush in and out abreast, pushing and squeezing each other, entirely setting aside their good manners, Many a "poll-evil" is caught by a low doorway. Doorways to stables, especially cart-horse stables, are almost invariably far too low.

When July has well set in, liberty and green meat begin to be curtailed. This ought to be done gradually, and the 1st of August must see the end of green meat. The first week in August is generally the commencement of the "conditioning" season. From this time to the commencement of the season the animal machine—the slackened strings—have now to be tightened. For this purpose, besides other things, of course, two doses of purging medicine, at least, are required. The whole tissues are saturated with water from the green food which has to be removed. The bowels drain it off nicely, and with safety, if stimulated to do so by aloes. We have said that at least two doses are required. We ought not to hesitate in using a third, if need be. No great preparation is required, but it is best to give a bran mash on two successive nights, and then give the physic on an empty stomach on the third morning, and continue the mashes till the purging sets in. The evacuations during the first dose are so watery and copious that men often get alarmed lest super-purgation should set in. This is seldom the case. We must remember what a store of watery material there is in the animal fresh from grass. However, this time is not without its source of anxiety. The excitement of the bowels is *great* and *prolonged*, and we cannot afford to overlook the fact because we cannot keep any organ in great activity for a length of time without risk. Sickness and loss of appetite we must always look for, but should signs of griping set in, we have to stop the purging if it has gone on over twenty or twenty-four hours, sometimes much less.

We can sometimes stop the purging, and with it the griping, by warm clothing and giving a pint of raw linseed oil and two ounces each of laudanum and sweet spirits of nitre. The hunting man cannot be too careful in procuring his purging balls. Usually he has the advantage of a professional surgery to send to. When he has no such advantage, then he has to resort to the chemist. He ought never to allow a groom to get ready-made physic from the chemist, nor indeed ready-made cattle or horse medicines of any description from this source. We do not wish to be understood to say that any respectable chemist may not keep most excellent horse and cattle medicines—it is quite possible for them to do so, but we never knew one who did. Certainly they *all* desire to keep good useful medicines, but the sources from which they get the prescriptions are often questionable. The purging ball ought to be very specially prepared of Barbadoes aloes melted in a water bath, and cayenne pepper added to it to prevent griping. A little tartarated antimony also increases the watery character of the evacuations, which is what we want now, so that a purging mass for conditioning purposes is made thus: Take of Barbadoes aloes, in small lumps, eight ounces; of glycerine six drams by measure; of tartaric antimony one ounce; of powdered cayenne pepper half an ounce—Melt the aloes and glycerine in a water-bath very thoroughly, then take off the fire and stir in the other ingredients whilst cooling. Calculate and weigh out as required. In doing so, each ball must be calculated to contain six drams of aloes for what is known as a six dram ball, and so forth.

In conclusion, we trust that we have given a fair sketch of the best modern method of summering a hunter. Of course, we do not pretend to have said everything regarding the matter, but have relied largely on the previous knowledge of those whom the subject concerns, and have rather pointed out a few of the more important matters in this wide subject than attempted to discuss the whole subject in every one of its aspects. In conclusion, our advice is to all hunting men; at the end of the season call in a good veterinary surgeon, and our suggestions, in the main, will be faithfully carried out.

THE END.

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