THE DOG'S RACING LEVERS AND BURROWING OUTFIT.

BY WOODS HUTCHINSON, M. D.

ALTHOUGH a dog's teeth are the most important thing in his make-up, his legs and feet are only a shade less so. And their purpose is equally clear, even if we had never seen him use them. They are to run with and to stand upon, and hence naturally placed "one at each corner," as the school-boy explained in his immortal essay.

But why are the back pair so different from the front ones? As the dog stands at ease, you can see that his front legs are almost perfectly straight and upright, like props supporting his chest, and the only joint you can make out in them is the "elbow" close up to the body. The hind legs on the contrary slope first slightly forward from the hip to a joint called the "stifle," then a long slope backward to another joint the "hock" and a short slope forward again to the paw. They are anything but straight, indeed "crooked as a dog's hind-leg" has passed into a proverb and you can see two very distinct joints. And as a dog's back is as high at the hips as at the shoulder, and a straight line is the shortest distance between two points (in this case his body and the floor) it necessarily follows, as I think your eye will tell you, though you can measure it if you choose, that the hind legs are distinctly longer than the front ones.

If you will look carefully at this skeleton (Fig 1) you will see that the bones are not only longer but thicker. Now which pair would you say had the heavier part of the work to do in running? You will generally find in animals, that of two similar structures or organs in the same animal, or even in two animals of the same family, the smaller has the less to do, or is of less importance.

Go and watch the dog as he runs and see if this "trial-conclu-
sion" is right. A gallop is the best gait to study first, because this is the only pace in which both hind-legs are moved together. If you can get him to run past you slowly enough, you will see that he is moving in a series of bounds or short leaps, throwing himself forward with his hind-legs and catching, or propping, himself with his front ones.

Get him to jump a fence or over a log, and you will see still more clearly that he brings his long, crooked, hind legs well forward under him for the spring, launches himself into the air by suddenly straightening them and catches himself on the other side upon his fore legs until he can bring his hind legs in under him again.

Now go watch his gallop again and you will be able to make out what part each pair of legs takes. He springs forward from his hind legs, catches himself with the front pair just long enough to "recover" or swing the hind one well under him again for the next spring; another "prop" with the fore legs, while the hind are coming forward into position again; another spring—and that is the gallop. A rapid succession of quick flat-jumps running into one another.

Mind it is only a very slow gallop that you will be able to take to pieces in this way, for if the dog is going at all fast, his jumps melt into one another and his legs make a confused blur,
like the spokes of a wheel. And to make it worse, when his hind feet come forward for the next spring, they do not only swing up to the planted fore feet, but right past them on either side and land well in front of them, so that at one point in his stride the dog is doubled up like a double-bladed clasp-knife with the blades half open or like a boy when he vaults over a post or “takes a back” at
leap-frog. (See instantaneous photograph, the second figure of the first row of Fig. 3.)

In fact when a boy goes over five or six backs in succession at leap-frog, or swings himself forward on a pair of croquet-mallets crutch-fashion, he is going through precisely the same movements as the dog when he gallops, only, of course, in the latter case, his “hind legs” swing forward between his “front” ones, instead of outside of them.

How can you tell that the dog’s hind legs swing forward outside of his front ones? In two ways. Go watch him gallop again

![Instantaneous Photographs of the Running Gallop of the Horse Sallie Gardner](image)

The last figure of the first row represents the hind legs brought under for another spring, and the first of the next row, the spring. The first of the bottom row shows the horse alighting on his fore feet.

Fig. 3.

and stand either directly behind or in front of him, and you will see that his fore feet are held comparatively close together, while his hind ones spread widely apart, just as ours do when we brace ourselves for an effort, so as to give him a broad and steady base for each spring.

The other proof can only be had on a smooth sandy beach or mud-flat in summer, or, best of all, upon the snow in winter. Then you will see that the track of a galloping dog is made up of three parallel lines of foot-prints, the two outer, long, narrow and with ragged scrape-marks at the heels from the plunging hind feet, the
inner round, clear-cut and almost single from the “propping” fore feet.

And if you will take any half-fused pair of the central marks, you will find that they are from two to six inches behind the corresponding pair of outer marks, according to the size of the dog and the rate at which he was going. In fact, this is the case with most animals’ tracks, and the way in which sportmen tell which way a rabbit or fox was going is by noticing which way the wide end of the triangle, made by each “set” of the four foot-prints, points and this will be forward. A “set” of foot-prints will seem to be made up of three marks instead of four, but if you will look closely at the middle print, you will see that it is partially double and made by the two fore feet coming down so close together as to often make only one mark.

Now can we get any clue from the foot-prints as to which pair of feet has been doing the most clawing or pushing? I think we can, for the prints of the fore feet are round, clear-cut and complete to the very toe-marks, as if made by a seal in wax, while the prints of the hind feet are long, ragged-looking marks sloping in under the snow at the toes and ending at the heels in a blaze of irregular scratch-marks. And if you happen to notice a big dog running at full speed, you will see that he throws a small handful of sand or gravel, or a little puff of snow, up into the air behind him, with almost every stroke of his hind legs. A pack of hounds, running at full cry in fine dry snow, will raise such a cloud of snow-dust at to almost hide them from view.

Do you think that our “trial conclusion,” that from the shape and greater length of the hind legs they did the greater part of the work, was correct? It would be safe to say that they are the “driving wheels” of the dog-engine, while the fore legs are little more than the “front trucks.” But why are they so crooked? Partly as you see at a glance, because they have to be doubled up, and brought forward under the body for each spring, so quickly, that one joint or bend in them would not be enough and partly for another reason.

Supposing you were challenged to jump just as far as you could from a certain mark on the ground, how would you go about it? Would you toe the mark, stand up just as straight as you could, and jump without bending your knees? If you did you would not get more than a few inches from where you stood. You would first bend your knees, then your hip-joints, and then lean forward on your tip-toes and bend your ankles, in fact make your legs as
crooked as possible. Then after springing up and down two or three times to "limber up and get the swing" you would crouch down so as to bend each joint to the utmost, suddenly straighten them by a violent effort and thus shoot forward into the air. You make all the curves possible in your legs, then by suddenly straightening them, shoot yourself forward like an arrow by the straightening of a bow.

Now when you have your leg bent, about half-way ready for the jump, it is precisely the same position and shape that the dog's leg is in all the time. He too, when he is getting ready for a leap, crouches down and bends his legs until his body almost touches the ground. When you are standing quietly the whole sole of your foot of course, from toe to heel rests upon the ground, while in the dog only the toes and a very small part of the sole touch the ground.

Is then his foot quite different from ours? Not at all, only that less of it touches the ground, for if you rise up and balance yourself on tip-toe with bare feet on smooth sand your foot-prints would be very much like his, only your toes are arranged in a nearly straight line across the print and his in a horse-shoe shape round the central "ball." In fact the dog walks as you run, (when you really run, not shog) always on tip-toe.

Why doesn't he stand and walk "flat-footed" or "heel-and-toe" and why don't we stand on our toes? If you will just try to do so you will soon see. It is very hard work to balance oneself upon tip-toe, because having only two feet to balance on, it requires the whole length of the foot upon the ground to give a broad enough basis to stand on, while the dog has two other legs to prop him up. So that Carlo can stand on his toes, in a way that we cannot at all, and he gets two advantages out of it, first that makes his legs longer, which enables him to run faster, and second, it makes another bend or curve in his legs, so that his gait is more elastic and springy when he runs, and more soft and noiseless when he walks.

And what is most curious, we imitate him in this respect whenever we want to steal along quietly, just as we say "on tip-toe" or when we want to run fast. The moment you get beyond a certain speed, up you go on the tips of your toes and your heels never touch the ground at all. This is both to get the longest possible leverage and to avoid jarring. If you doubt the latter try to run fast "on your heels" and see what a terrific shaking up it gives you, or jump over a bar and light on your heels instead of your toes.

Nearly all animals walk on their toes; some like the horse and the cow, even on their toe-nails and only the bears, the badgers
THE DOG'S RACING LEVERS.

529

and a few others walk, like ourselves, on the heel as well. Has the
dog got a heel at all? Let us compare one of his hind legs with
one of our own and see.

First of all there are the four toes each with a claw on it,
which evidently correspond to our five with their nails, then we
have a rounded pad just behind these, just like the ball of our own
foot. Then comes a straight, slightly-flattened part of the leg which
runs up and back to a sharp, almost right-angled bend in the dog's
leg, his knee, apparently. Put your hand on this joint and you will
readily feel that the "squareness" of its bend is due to a short spur
of bone which projects just as your heel does behind your ankle.
In fact this hock, or apparent "knee" of the dog, is really his heel,
and the part of his leg between it and his toes corresponds to the
long sole of your foot.

But where then, you will ask, is his knee? Follow his leg on up,
as it slopes quietly forward from the hock, and just below the level
of the lower line of his body you will find another joint, which
points forward and has a bony knee-cap in front of it, just like
your own knee. Above this the leg slopes backward again to a hip-
joint just like yours, but which seems to be right up in his body,
so to speak, at the upper part.

The same is true of his fore leg and our arm and hand, as you
can readily verify by comparing. And this arrangement is also
found in most animals: the thigh is partly buried in the body, so
that the real knee scarcely shows, then comes the leg proper, run-
ning down to the hock, which is popularly called the "knee," as
in the horse, the cow, the deer, but is really the heel. Probably
the best way to remember that hocks are not knees is to notice that
they bend backward, instead of forward, as real knees would.

And now are we ready for the question what is the use of legs?
To move about with, of course. But what of seals and fishes and
worms and caterpillars? They all move and some of them very fast.
A trout in a clear pool, if you startle him, will dart away so quickly
that your eye can scarcely follow him; he was there, and he is
somewhere else, that's all you can say; and yet, none of them has
a trace of a leg except some caterpillars, who however move chiefly
by "humping" their bodies and straightening out again. So that
I think we shall have to add, "on land," to our definition of the
use of a leg.

But all these animals we have mentioned, that move at all, have
something to move with. The fish has fins; the worm has short
stiff bristles which you'll easily see if you catch a big one and look
at his under surface with a weak magnifying glass; or still more easily will feel, if you rub your finger gently underneath him or let him crawl over your hand. If you compare the things they move by with another you will find they are all little rods or levers, jointed on to the body, so that their free ends can strike on some substance or surface and push, or hitch, or waft the body forward. And when we remember what substance the lever is to strike against, we will find that the thinner and lighter this is, the broader the lever, or fan of levers.

Thus a fish’s fin which has to push against the thin, fluid sub-

stance, water, is broad and paddle-shaped just like an oar or like you make your hands when you try to swim. A bird’s wing, which beats against the still thinner and lighter substance, air, is spread out into a huge light fan of feathers just stiffened with bone, like the masts and boom in the sail-spread of a yacht. The interesting thing about all these shapes of levers is, that they are every one, the fin of the fish, the wing of the bird, the paw of the dog and our own foot, made up of precisely the same groups of bones and joints, fingers, wrists, forearms and (except the fish) arms, differ-
ing only in number of fingers and wrist and hand bones. And still more striking, the "hands" of all these "legs," except the fin, are made up of exactly the same number of finger-bones, or the traces of them, and this number is easy to remember, for it is the one which we have on our own hands and feet, five.

The dog, as you can readily count, has almost his full number, five in front and four behind, but the sheep has only four, two big ones or "hoofs" and two little shorter ones on each side, the cow only two big ones, and the toe-nails of two others, one on each side of the leg, six inches up, while the horse caps the climax with only one big central toe-nail and finger, or "hoof," and just the
"AILSA," A RACING YACHT.

Showing similarity of mast, boom and gaff, to bones in bat's wing.

Fig 6.
“splint” of another finger-bone on each side, which you can feel above his fetlocks.

If you look at this drawing of the bones of each of these feet, side by side, you will, I think, see at once why we think that all these forms have grown out of one common primitive type with five toes. Indeed some would carry it still further back and say that all legs, wings, fins and paddles of every sort have grown out of a crop of stiff paddle-like “bristles” or *ciliae* (Latin for “eyelashes”) such as the oyster is covered all over with, in his kindergarten days, before he grows a shell and settles down for life. These *ciliae* are slender, whip-like little hairs, but very active, and by all lashing in one direction at once they send the young oyster flying through the water as if he was an eight-oar racing-shell.

And this is the way that a great many legless creatures move through the water. Then we may imagine that ten or a dozen of

![Diagram](image)

**Diagram to show the relation of the anterior limb to the trunk in fishes, and its similarity to the higher vertebrates, more obliterated in A than in B.**

(Wiedersheim.)

*S*, pectoral arch; *Mt*, metapterygium; *Rd*, radialia in A, radius in B; *Ul*, ulna; proximally to *Ul* and *Rd* is the humerus.

Fig. 7

these *ciliae* grow longer than the others and get fused together and a soft flap, like an eel’s fin, is formed; two or three of these on each side send the animal along faster than the hundreds of tiny lashes did. They soon grow long enough to need stiffening and tiny rods of gristle form and soon turn into bone, by filling themselves full of lime, which sets into tough, living plaster. These are the fingers which in the fish’s fin may be ten or fifteen in number, but steadily get fewer until in the frogs and salamanders they become five and never get beyond this number again. This hand, with its wrist-joint, is all the fish needs, because the water floats it off the bottom, but as soon as animals begin to crawl out on shore, then they have to use their fins to lift and help themselves along with, as several sorts of fish do. Soon in the frogs and newts an arm and leg grow out to lift them above the ground, and finally as they get further out
THE OPEN COURT.

Hand of Man.
5 fingers

Foot of Dog.
4½ fingers

Fig.
4 fingers

Water-Deer.
4 fingers, but 2 side ones much smaller

Sheep's Foot.
2 central fingers
side ones disappeared.

Abnormal Horse's Foot
(Bifid).

Horse's Hoof.
1 central finger.
All others gone but remains of meta-
carpals of 2nd and 4th fingers.

Different forms of "Hand-Foot".
(Wiedersheim.)
Fig. 8.
of the mud an upper arm and thigh appear, and now we call them lizards and they can run quite fast.

From this on arms and legs continue essentially the same, changing as we shall see according to the uses they have to be put to.

Mind, we cannot say that the fish turned into a frog, by trying to walk on land, and the frog into a lizard by keeping at it, but only, and this is most important if we want to understand arms and legs, *that the legs of each of these animals have been gradually changed from one common type, so as to be suited to the different uses to which they are put, in each given case.* So that if you study an animal's legs you can tell in advance the uses to which they have been put, or contrariwise, if you know the uses, you can guess at the make-up of the legs.

What makes this even more interesting is, that as we grow up

![Diagram of Fore Foot of Ancestral Forms of the Horse](image)

**FORE FOOT OF ANCESTRAL FORMS OF THE HORSE.**

*Wiedersheim.*


Showing how one animal's foot has gradually lost its toes in the last three geological periods. Roman numbers refer to the original number of the toes.

*Fig. 9.*

from the egg, each of our wings, paws or hands, as the case may be, buds out from our bodies, like a blunt flipper or fin, then splits into fingers and toes, even in young birds in the egg, next gets gristle-rods in it, then changes by hardening into bone, so that at one stage we have hands growing out of our shoulders, but no arms. Soon these bud out further and the forearm appears and lastly the arm and thigh. And if, at a certain stage, you were to take a little bird out of the egg, and a young dog or sheep out of its mother and examine the limb-buds or "hands," you could hardly tell them apart.

So then the dog has grown his long, stick-like legs so as to run fast upon dry land, or if you like to put it the other way, he can run fast upon dry land because he has such long and well-
grown-out legs. But why need they be so long? A frog’s, or a lizard’s, or a rat’s are not half so long, even in proportion to their size. But can they run as fast? Of course not. Running, as we have seen, is simply plunging or falling rapidly in one direction and catching oneself before one’s body strikes the ground. So that the longer the props that lift you above the ground and the further you can plunge or fall forward without striking it, the longer the levers that drive you forward and the farther you can spring.

All very swift animals, such as the deer, the horse, the greyhound, have long legs for this reason and are good jumpers as well. But now comes a question why have no two of these the same kind of feet, though their legs are practically the same? Which we answer by asking another: “Do they use their feet for different purposes?” Of course they do; they all run, but beyond this their feet are put to widely different uses, and if we remember these we shall, I think, find some reason for each form of foot.

What does the dog do, or need to do, with his feet that horses, cows and sheep do not with theirs? Scratch and dig holes in the ground, for one thing, and if you will look at the paws of all animals that burrow, moles, rats, rabbits, wood-chucks, you will find them all four or five fingered, broad, rather flat “scoop-shovels,” with four or five sharp, strong trowel-shaped nails or claws. So that I think we may call this the burrowing paw.

But if this be the meaning of Carlo’s many-toed, nail-shod foot, we ought to find his fore-paws broader, stronger and more scoop-shaped than his hind ones, because two-thirds of his burrowing is done with these, the hind paws simply throwing the dirt back out of the hole dug by the front ones. And that is just what we see, five toes on the fore paws and only four on the hind ones. But, some of you may ask, is digging of so much importance to the dog as to really influence the shape of his foot?

You thought the chief use Carlo made of his claws was to dig up the flower-beds and ruin the grass-borders while burying bones in them, or to scratch the polish off the door in trying to get out of the room. Well, that is perhaps about all the use he can make of them in town, but take him into the country and show him a rabbit-hole or a chipmunk’s burrow under an old stump and he’ll soon show you what his claws are for. Before he was tamed he had literally to dig for his living; and his first cousin, the wolf, and second cousin, the fox, do so still.

You can see how important it must have been to him once, hundreds of years ago, by watching how excited he gets over it.
sending the dirt up into the air behind him in a perfect shower, gnawing at the roots with his teeth, yapping furiously and behaving generally as if he were crazy to eat the whole field up. Though he probably isn’t hungry at all and knows perfectly well that he’ll get his dinner just the same when he gets home, whether he catches that rabbit or not. Indeed you ought to watch him, and call him off after a few minutes or he’ll scratch till his toes bleed and be sore-footed for days afterward, if he hasn’t been doing plenty of digging lately. He gets soft-footed in town just as you get soft-handed.

Then, when he used to have to live upon what he could catch, he would often kill more rabbits, or a bigger deer, than he could eat at once and what was left of it he would dig a hole for and bury carefully, to keep other animals from finding and stealing it. Just as he will do in town with his bones and surplus scraps, though he may be so well fed, that he’ll often forget to go and dig them up again. But he can’t forget that there was a time when strict prudence compelled him to bury everything that was left of his share of the deer at once, as it might be a week before he got another.

Then another important use of his claws when he was wild was to dig a burrow for himself to sleep in, though I am ashamed to say that he usually stole a rabbit’s hole and enlarged it, after eating the owner. Then when the warm days of spring came both father and mother dog, or “wolf,” as their name probably was in those days before the cave-man adopted them into his family and gave them new names, would fall to work with tooth and nail on the sunny face of a warm, sandy bank, in some snug hollow in the woods and scrape out a splendid cave-nursery, with a tunnel entrance and one or two long side passages with hidden outside doors at the end. Then they line this with grass and leaves, which they carry in their mouths, and mother-wolf scratches off some of her fur to make the nest softer, and all is ready for the baby-wolves.

What else are the dog’s feet better fitted to do than the horse’s or cow’s? To run softly and steal up upon things. You can hear the hoof-beats of a galloping horse a mile away, on a still day, and even at a trot you can tell he’s coming long before you can see him down the road, but a dog gallops so silently and springily, that you can hardly hear his foot-falls at all except on a pavement or hard road. Upon a pavement or on hard smooth ice you can hear his claws rattle in the most curious fashion, but upon an ordinary dirt or grass surface you can hardly hear his foot-fall fifty yards away, and when he is creeping up upon a rabbit sitting
in its "form," or a quail in the grass, you can't hear a sound except the faintest rustle.

A dog who is clever at stalking, like his second cousin the fox, will steal so skilfully up the wind upon a hare or a partridge sleeping in its tuft of grass, guided only by the smell, that he will often get near enough to pounce on it before it even suspects he is in the neighborhood. Some dogs are so skilful at this that hunters use them just to point out where partridges, or quails, or prairie chicken sit in the long grass, and they have trained them to stop dead, or "set," when they come within a few yards of the birds, so that the gunner has time to come up to them and be within easy shot when the birds fly up. These dogs are called "pointers" and "setters" from the work they do and we shall see in another chapter what a wonderfully keen scent they have, and why they stop short instead of pouncing on the partridge.

In short, the dog walks continually "on tip-toe," partly for the same reason that you do when you are trying to cross the room without waking the baby, and when he really tries to walk softly he beats us hollow and indeed almost any other animal except the cat whose velvety paws and supple legs are even better adapted for the purpose. He has almost what Kipling says of the wolf, in his splendid "Song of the Seonee Pack."

"Feet that will leave no mark, no mark,
Eyes that can see in the dark, the dark."

If you want a true, living picture of an animal in the fewest and most vivid possible words, go to the Jungle Books.

But what of the horse and the cow? Do they need to dig for their food or to steal up to their prey? Of course not, for they eat only grass and corn and leaves which grow right above ground and can neither hear them coming nor run away if they did. So there has been nothing to hinder their feet from growing as hard and stiff and heavy, as may be needed to carry their great bodies over hard level ground, at a high rate of speed. Their toe-nails have turned into thick, hard, stiff cases or "box-shoes," which cover the whole surface of their toes, and no matter how slowly or carefully they walk you can hear every foot-fall a hundred yards away.

Of course they have gained something by this change or it would not have happened. No living dog, except the "manufactured" greyhound, can keep up with most of the hoofed animals, the antelope, deer, horse and even Texas cow for a mile or two-mile dash. In fact they have literally put on thick-soled boots to run
in, just as we have in town, though we can go barefoot very comfortably in the country. And the one that runs hardest and longest, the horse, has grown the hardest and solidest hoof.

A good way to see which is the toughest foot on a hard surface is to start off on an all day drive and let Carlo try to run behind the carriage; you'll find after twenty or thirty miles he'll be very glad to get in and ride, in fact, if you are going more than ten or fifteen miles, you ought to watch him very carefully and take him in for a lift, at least, as soon as ever he seems tired, or he will wear blisters on his feet trying to keep up with you. On natural ground such as grass or fields he will gallop all day, especially if he can get his feet wet and cooled off in some pool or stream every hour or two, but even then he won't cover more than twenty or thirty miles with comfort, while a good Arab, English thoroughbred, or broncho, in galloping trim, will cover from sixty to eighty miles easily and has been known to go a hundred and twenty, when riding for life or carrying despatches.

When we are hunting prairie-chickens, on the dry upland prairies, we always carry a large jug of water and a bucket to cool the setters' feet every hour or so, if we don't happen to find a pond or well. Dogs often suffer great discomfort both on the road and in the hunting-field simply because their well-meaning owners don't realize how tender their feet are, and it is always well to be very careful, when you are driving or cycling with your dogs to give them plenty of chances to run down to every stream they come to and time to lie down for a few minutes afterward. The dear fellows, of course, will keep up with you if it wears out every toe they have, and if they are afraid that you'll go on and not wait for them, they often won't even run down to the streams at all, for fear of being left behind. The best motto in driving or cycling with a dog across country is "fair and easy goes far in a day," and you'll find it doesn't work badly for you either.

The dog's foot is neither a shoe to walk in nor a horn boxing-glove to fight with, as in the horse, but it is just the kind of a foot the dog needs in his "business." A capital entrenching-tool, a pad for highway robbery, a springy, elastic support for the slow but tireless gallop of the blood-trail, up hill and down dale, it is all of these. But it is neither a hoof nor a hand. Our own hands and feet are built on precisely the same principle of meeting our needs out of almost precisely the same raw material of five fingers. We have kept the full number both in front and behind, and our front toes have grown long and well-separated, with the first one
coming round to face the others and form a thumb, so as to grasp things and climb with, while our hind fingers have grown shorter and “blocked” together side by side, to furnish a firm pillar of a strong elastic arch supporting the body. Our fifth ("little") finger is shorter than the others and slenderer both in front and behind, while in the dog you will find that the first or inner toe of the front foot does not reach the ground and in the hind foot has disappeared entirely, except in some breeds where its toe-nail still persists six inches up the leg and is called the "dew-claw."

It is always the “outside” toes on either side of the foot which tend to disappear; the cow has lost the “thumb” or first entirely, and all but the nails of the second and fifth, walking upon the third and fourth or “middle”- and “ring”-fingers, and the horse has lost all but the third or middle one, the toe-nail of which bears his whole weight. If you feel his leg carefully just above the fetlock or “ankle” you will make out a long slender “splint-bone” running along each side of it, which are the last remains of his second and fourth toes. No animal keeps any more toes than it has full use for and nearly all the climbers, burrowers and hunters have kept their full number, while most of the browsers have lost over half of theirs.

Now let us see how the legs and gaits of the different kinds of dogs and their relatives vary. To begin with the probable father of them all, the wolf. His legs are slender but strong, his feet small and compact so that his foot-print looks as if he had only three toes, and there is a great deal of hair between his toes. His trot is long, swinging, tireless and "eats up the long miles like fire," and his gallop the most beautiful gait the sun shines on. He carries his head up and shoulders erect like a well-bitted cavalry charger, ready to wheel in any direction, on an instant’s notice, his legs are kept well under him, his hind feet swing forward to below his ears at every bound, and he sails along like a swallow on the wing, or a balloon on legs, his feet scarcely seeming to strike the ground.

But with all his grace and airy lightness he lacks driving force, and his heavier-boned, deep-chested, sullenly determined descendant, the sleuth- or trail-hound, will wear him out and run him down in the long, stern chase which is given to the music of the baying pack.

Both the wolf and the fox gallop lightly and with a gliding movement close to the ground, while their hereditary enemy and blood-relative, the hound, has a heavy, noisy, plunging gait like a
steam-tug in a heavy sea. He carries his head low to follow the scent of the trail (except when it is warm enough for him to take it breast-high) and his tail up as a signal to the rest of the pack, just the exact reverse of the wolf. But every inch of him, from the end of his nose to the tip of his tail, is working for dear life.

You can see every one of the plunges and props, of which we found a dog’s gallop was made up. It is not a graceful gait,

but it “arrives,” as our French cousins say, and will wear out and run down the wolf, the panther, the deer, the antelope, the hare, all of which are capable of nearly double his speed for the first three to five miles.

But the champion galloper of the dog-world is the greyhound. He is scarcely a dog, but a racing machine. His legs, his feet, his tail, even for some unknown reason, his nose, are long, slender and
graceful as a deer’s. At first sight he is all legs and chest, his head simply his neck whittled down to a long point, his waist, or as fanciers call it his “coupling,” like a wasp’s.

But put your hand on the small of his back and you’ll find that his loins are one superb, rounded, Atlantic-cable of steely muscle and look small only by comparison with the splendid depth of his chest. His hind-quarters, instead of being square, curve gracefully round in one continuous sweep from his arched back right down to his hocks. In fact all of him behind the last rib forms one great continuous “C-spring,” which splits into legs in the lower half. To see him run is a poem, for when that long back-rump-legs spring curls up so that his hind feet are just under his nose and then suddenly straightens itself, as it does every stride of his gallop, the leap he takes is something tremendous. Scarcely do his fore feet touch the ground when forward come his hind spring-levers again for another splendid plunge, so that every inch of his body from his cars back seems to be driving him forward.

His gallop is not so graceful and gliding as that of the wolf, but it is nearly twice as fast, and a good greyhound will overhaul a coyote hand-over-hand, if he can only keep him in sight. There is his weak point, however, he goes at such a pace that he could not possibly catch the scent, even if he had a nose like the hound, so that when he reaches the top of the ridge over which the wolf or antelope has disappeared, he has no idea which way it has gone unless it is in plain sight. You will see him leap madly up into the air four or five feet and stare wildly around in every direction, and if he can catch so much as a glimpse of Brer Wolf off he goes like a shot, but if he can’t, that is the last of his chance, for as a matter of fact he has hardly any scent at all and if he had he’s too lazy to use it.

And to make it more provoking, it will often happen that you from your seat on horseback can see the game more plainly, but you can’t show it to him and he won’t stir a step till he sees it, no matter how you wave and shout at him. If you can call him to you and your horse is reasonably steady—which does not often happen on the plains though—you may get him by the collar and hoist him up on to the saddle before you and perhaps succeed in giving him a glimpse of the game, and if so he’ll drop off and go like a shot in that direction. But it is only one dog in ten you can do it with, even if your broncho has no objection.

A greyhound has only one sense, his sight, and unless he can bring that to bear he is useless as a saw-horse and ten times as
provoking. You can send a setter or pointer or spaniel half a mile in any direction, simply by a wave of your hand, but your greyhound like Kipling's "Heathen in his Blindness" "won't obey no orders except they is his own," and the more you expostulate with him, the more likely he is to turn sullen and either lie down or start off in precisely the wrong direction, with an expression of utter boredom.

I once galloped at the top of my pony's speed for more than a mile close behind a wolf, shouting frantically to my silly greyhound, who was amusing himself about a quarter of a mile away and who when he did at last come up, just as the wolf was disappearing over the brow of the next ridge, instead of dashing forward, fell calmly behind my pony's heels, just as if I usually exhorted him to follow we in that tone of voice, and with such unprintable adjectives.

But that is the greyhound way, you never can depend upon them, for even if they see the hare or wolf plainly, it is even chances whether they start or not. If they do not like the lay of the ground or the color of the hare or the length of his ears, or the stage of the moon is not quite to their taste, they will calmly look the other way and refuse to budge, which is peculiarly soothing to your temper. They are as fanciful as fine ladies at a lace counter, and I have seen the fastest dog in our pack get "miffed" and for no apparent or imaginable reason whatever, flatly refuse three jack-rabbits in succession, two "jumped" within fifty yards, and one chased by another dog literally almost under his nose, and then dash after the fourth bunny like a rocket and catch it within two hundred yards.

Indeed you never think of going out with less than three dogs, so as to be sure of having one start, whenever a hare is put up.

I have given quite a full sketch of the greyhound, because he is an example of a rule that is very common among animals. And that is, that to do one thing extremely well usually means doing certain other things very poorly. The pure greyhound can do one thing superbly, run by sight, but that is about all he is fit for. His name, by the way, means this and has nothing to do with his color which is commonly black, mouse-color, or buff, almost never grey. It was originally "gaze-hound" and has gradually become corrupted to "greyhound," as easier to say, but in some of the old ballads and hunting-songs you will find it spelled "gaze."

By depending on his eyes and speed he has almost lost both scent and sense, so that he can in some cases scarcely recognize his
master by smell, and will lounge after any loafer, who will pat and feed him a little, so that he's never certain to be at home when you want him. A run of three miles at speed is about all he is good for. He has poor intelligence and worse manners, if you try to teach him any thing it is labor lost, and if you take from him the hare he has killed before he can eat it, he is quite likely to fly at your throat.

In short, as I said before, he is a racing machine, instead of a dog, and in spite of his beauty and speed, one of the most disappointing creatures on four legs to try to make a friend and companion of. Notice I say "pure-bred," for there are plenty of half- and three-quarter-bred dogs which are both intelligent and devoted.

My friend Pedro, who could trip up a wolf so cleverly, had one-fourth of bull-dog in him, and in fact on the plains for big game we find it absolutely necessary to use only greyhounds with some bull-dog blood in them, to give them the stamina, endurance and pluck needed. Even though your thoroughbred is faster, he is so easily discouraged that a three-quarter-bred dog, with less speed but more "stick-to-itiveness" will catch many more hares in a week, to say nothing of real heart-straining gallops after antelope or coyote.

For the matter of that, a drop of bull-dog blood improves almost any dog, not only in courage and endurance, but also in intelligence, and some strains of greyhounds are regularly crossed with it every four or five generations.