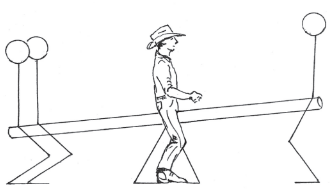
Murdoch Method Presents the 'Ride Like a Natural' Reader Series

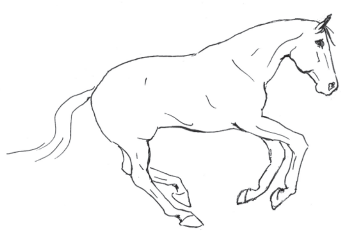
Anatomy of a Good Seat

By Wendy Murdoch, M.S.

$14.95

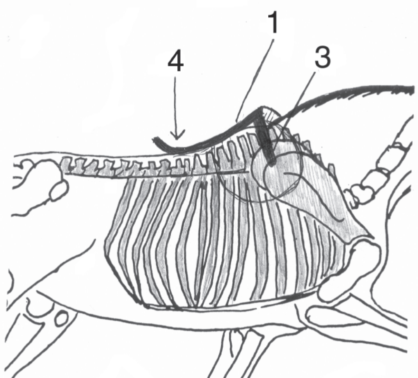
If only we had X-ray vision:
A closer look at how the horse functions





The Equine Seesaw:
How the horse can horizontally counterbalance

Rider Self-Carriage



What the Saddle Does

Plus...

Gravity and Riding
Our skeleton – a bowling ball, a flexible straw, a bowl and a pair of stilts

Gravity Part 2
The horse's skeleton – a bowling ball, a flexible straw, a bowl and two pairs of stilts

Table of contents:

This booklet is dedicated to Allie Thurston, whose images I have "borrowed" profusely and whose whitty sense of humor kept me laughing throughout our travails.

Published by:
Eclectic Horseman Magazine
PO Box 174 Elbert, CO 80106

Disclaimer of Liability
The author and publisher shall have neither liability nor responsibility to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this book. While the book is as accurate as the author can make it, there may be errors, omissions and inaccuracies.

These articles first appeared in *Eclectic Horseman Magazine* from July 2003 to June 2004.

Murdoch Method, LLC has booklets available at a discount in bulk quantities for promotional purposes. For details about special sales, contact:

Murdoch Method, LLC
PO Box 488
Washington, VA 22747
www.**murdochmethod**.com
540-675-2285

Acknowledgements: Fran Loftus and Andy Foster – graphic artists
Andrea Parker – graphic computer artist
Emily Kitching – publisher Eclectic Horseman Magazine
A special thanks to Bradley Schneider for his overwhelming support.

Preface

One might think that after surviving the birth of one book I might quit. Well it seems my fingers can't stop typing the thoughts running around in my head. Even before Simplify Your Riding *was finished I had begun on a new series of articles for* Eclectic Horseman Magazine. *The goal was to write articles on lateral work but I soon discovered that there was much to be said before actually writing anything about going sideways on your horse. First you needed to know what you were trying to accomplish and why moving the horse laterally might help. As a result the first six articles are presented here in* Anatomy of a Good Seat.

It was quite gratifying to finally get these concepts into print. I had been trying to write an article about the horse being on the bit and in self-carriage for years. The stumbling block was the images. One cannot publish photos without reproduction rights. Hence I could not print the images I use in my lectures. But, after taking a series of Anatomy in Clay® courses with Jon Zahourek I discovered suddenly that I could draw horse skeletons! Granted they could be better if I was a trained technical artist. Be that as it may I think you will find that my humble skeletons get the point across. Fortunately I was able to recruit two wonderful graphic/artists to help me with the other illustrations in The Essential Elements of Lateral Work *reader and* The Effortless Rider® *reader*.

In time my hope is that these readers become fully-fledged books but that could take years. I decided to publish them in this form so that my students and all equestrians trying to improve themselves could benefit. I hope you enjoy the information herein and please feel free to contact me via email or post a message on my bulletin board with your questions and thoughts. My response time seems to be dictated by the wordiness of the email. Short and to the point yields the fastest response.

Always remember to enjoy the ride!

Wendy Murdoch

About Wendy

Wendy Murdoch has ridden since childhood in a variety of disciplines including Hunters, Dressage, Eventing, and Reining. In 1984 while working towards her PhD in Equine Biomechanics, Wendy incurred a severe riding accident. The accident changed the course of her life from theoretical study to applied biomechanics for both horse and rider. As a result, Wendy has been teaching internationally for over 18 years. Her goal is to make riding more enjoyable and fundamentally simple by showing her students how to achieve what great riders do naturally.

Wendy's students range in disciplines from Dressage, Eventing, Reining, Hunters, Jumpers and pleasure/trail. Wendy works with riders of all abilities, levels, and ages. The principles she teaches are fundamental to all riding. They are refined and specific in order to benefit not only average riders, but also those at the top levels of competition. Wendy's thorough knowledge of anatomy, biomechanics and teaching gives her a wide range of tools to assist each rider to achieve their goals.

Wendy holds a Master's Degree in Equine Reproductive Physiology from the University of Kentucky (1986). Her background includes intensive study with Linda Tellington-Jones, Founder of TTEAM®; and Sally Swift, Founder of Centered Riding®. In 1992 Wendy became one of an elite group of people to apprentice under Sally Swift. She has also worked closely with Dr. Joyce Harman, holistic veterinarian and noted authority on saddle fitting; Bettina Drummond, an authorized representative of the Nuno Oliveira School in North America; Jon Zahourek, creator of Zoologik®, Equiken Anatomy in Clay® system for learning anatomy; and Dr. Hilary Clayton, recipient of the McPhail Chair at Michigan State University to study biomechanics in dressage horses.

Wendy believes that continuing education is essential to achieving her goals. In May she completed the 4-year training. and is now a Guild Certified Feldenkrais Practitioner®. As such Wendy now has more ways of presenting the fundamental riding principles to her students. In addition Wendy continues to study anatomy. She has completed the Zoologik®, Equiken®, Advanced Equiken®, Maniken®, and Comparative Anatomy courses. In addition Wendy has organized and participated in two courses with Dr. Hilary Clayton: Anatomy, Conformation and Biomechanics Workshop (2004) and The Dynamic Horse Seminar (2005). Wendy has traveled to Europe to further her education by attending the Global Dressage Forum (2004-05) in Tilburg, The Netherlands and has had the opportunity to work with Arthur Kottas-Heldenberg, Retired First Chief Rider of the Spanish Riding School, considered the best Dressage rider in Europe in 1998.

In addition to her teaching, Wendy takes time to write. Her articles have appeared in numerous magazines including *Dressage & CT*, *Equus*, *Practical Horseman*, *The Trail Less Traveled*, *Eclectic Horseman*, and *USDF Connections*. Her first book *Simplify Your Riding* was released in March of 2004. In her writing she uses visual images, clear illustrations and kinesthetic exercises to help the rider feel, see, and understand the concepts presented. Wendy is committed to making complicated riding concepts easy to understand in common language.

Gravity and Riding

Our skeleton—a bowling ball, a flexible straw, a bowl and a pair of stilts

As students of horsemanship many of you have expressed an interest in developing your horses' educations further by exploring lateral work. This article lays the foundation of understanding necessary for learning lateral work with your horse.

Bear in mind that this material is pertinent regardless of the activity you are doing with your horse, whether that is riding, driving, packing, pleasure, performance, going straight or going sideways.

You might think that I am going to state the obvious in this article. However, I find it is necessary to keep the over-arching, simple concepts in mind for when things get more complex later on. Remember that sometimes it is the simple and the obvious that is most overlooked when difficulty arises. If you can come back to a simple idea, you often can find your way out of the problem.

Gravity

Let's start by talking about the one thing you cannot escape—gravity. Gravity is the force exerted downward on an object. Most of us remember it from high school science class. Newton discovered gravity by observing an apple falling from a tree. Gravity is what causes the bathroom scale to read your physical weight. Therefore, the weight of an object is a function of gravity. Remember when the astronauts bounded across the moon? (Am I dating myself?) That was because there is less gravitational force on the moon. If you were to go to the moon, you would weigh a lot less and your horse could jump a lot higher.

> *"Gravity determines the laws by which we move, determines if we are moving well and ultimately can kill us if we get really out of line."*

Gravity is acting on you all the time. You can't escape it as long are you are on this earth. You are born into gravity; you live in gravity; you die in gravity. Gravity in many ways is the Lawyer, Judge and Executioner in our lives. Gravity determines the laws by which we move, determines if we are moving well and ultimately can kill us if we get really out of line. It is the universal principle which determines what is "right" and "wrong" with how we live, move, breathe, ride and train our horses.

Gravity determines how we move because it is the force we must resist in order to be upright. If we were jellyfish or some algae growing on a rock, we would have much less difficulty. However, since we stand upright and walk over the earth, we must have a system that can, not only handle the force of gravity, but also move us across the earth (our skeleton and muscles). Gravity is what we have to overcome to be upright; therefore, it sets the rules of good vs. bad movement.

If we use ourselves well, then gravity is kind to us; it does not judge us too harshly. However if we use ourselves poorly, gravity can be very cruel. Think of an old woman all hunched over, having difficulty breathing and walking. Over the course of her life, gravity has been pushing on her and has actually caused her to be bent over like a tree weighted down with snow. This posture puts a tremendous amount of strain on the internal organs, the heart, lungs, etc. Or if that old woman has a disease such as osteoporosis, where the bones are brittle, she would no longer be able to support herself within gravity. One minor accident and her bones could break leaving her bedridden.

The most serious effect of gravity is severe injury or death. Falling from a height and then suddenly coming in contact with the hard earth can be fatal. Interesting that not even an American lawyer has found a way to sue gravity for the damages. In fact, this is how I got into teaching riding in the first place.

My life changed inexorably in 1984 when a horse I was riding flipped over backwards onto me. One minute I was a graduate student at the University of Kentucky riding horses in my spare time. The next minute a 1000-pound beast was rolling over me and I was being hauled off to the hospital. My left hip socket was broken, not to mention my pelvis in two other places and some ribs. I now have three pins in that hip socket. I felt the full impact of gravity that day and it has had a profound effect on my life since then.

I have to admit that while it was a pretty rough go for a while, that accident was the best thing that ever happened to me. I had to design my own recovery, since my orthopedic surgeon did not consider me an athlete nor understand why I was concerned about being unable to sit cross-legged or ride comfortably. He did not prescribe any kind of physical therapy or rehabilitation program once I left the hospital. When I was discharged, I required full-time nursing care and could not get out of bed on my own, never mind doing a lot of other things. I refused to accept his limited view of my abilities, and as a result, I am moving better now than before the accident.

At the time of my accident I was already interested in biomechanics (the mechanics of movement in living things); therefore, I became my own research laboratory. The past 19 years have led me on an incredible journey into the understanding of movement in both horses and riders as well discovering how to help people avoid situations like mine. As a result, I have a much greater appreciation for the function of the human and equine body as well as a deep respect for gravity.

When we are moving poorly within gravity, it weighs us down, makes our joints ache, causes our movements to be stilted, and sets us up for a fall off our horse. When we are moving efficiently within gravity, our movements are elegant, graceful, effortless, light. In riding, I am not the one who tells my students when they get aligned with gravity; they feel it for themselves, and their horses respond differently by also becoming light.

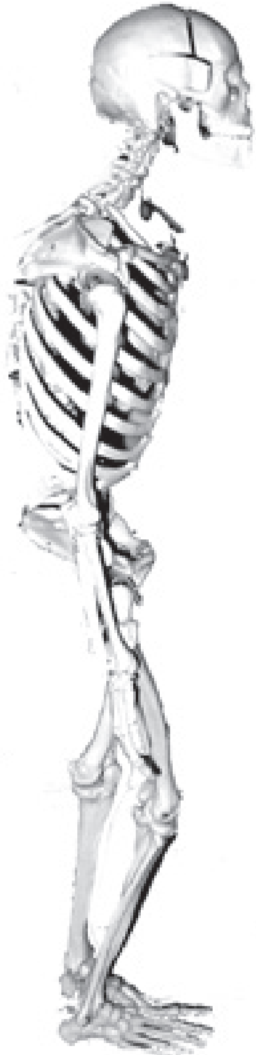
My job as a riding instructor is guiding my students toward this place of efficient movement within gravity. In many ways this is a tougher teaching job than going with the current fashion in riding styles. The judge is gravity, and you don't get a lot of leeway with him. However, the rewards are so great that it is worth the struggle.

The reward is when the horse can respond to the subtle aids of the rider and the rider can respond to the movements of the horse because they are in a position where they are able to respond to each other. Neither of them is distracted by the pull of gravity, which always demands attention first before the horse or rider can deal with the other's request. When you are busy putting out a house fire, there is not much time for conversation about where to plant the pansies in the garden.

One thing that is truly amazing to me is that we (horses and humans) can detect extremely subtle differences in position and alignment. The detection mechanism is our nervous system - brain, spinal cord and nerves. The nervous system is designed to monitor our position in relation to gravity. I find it incredible to observe how horses and riders can feel slight changes of position within tenths of an inch. Yet these minute changes make all the difference between mediocre performance and brilliant performance. In order to notice these differences, we need to be able to tune into our own body and the effort we are making to withstand gravity.

Our body is made up of a skeleton, muscles, the nervous system and the internal organs. We are not going to worry about your guts here other than to say that they weigh a lot. Therefore, you need a framework to support them. That's the job of the skeleton.

The skeleton is designed to support and protect the internal organs. In addition, it allows us to locomote (move around). Without joints we wouldn't move well; we'd move more like stick figures than like humans. Horses are designed in a similar fashion. They have a skeleton, muscle system, nervous system and internal



Poor Alignment

Look familiar? This could be you driving your car or sitting at the computer. Otis has sucked his chin forward so that the bowling ball is no longer balanced over the flexible straw. You can imagine how much work this makes for the muscles at the back of the neck and down the back of the spine. Also notice how the chest is collapsed, rounding the rib cage between the shoulder blades. This is the classic slumped shoulder posture. Trying to pull the shoulders back only adds tension to the system. Instead, the rib cage and spine need to move forward, thereby supporting the shoulder girdle.

Good Alignment

Good alignment of the skeleton standing. (Remember—this is a plastic skeleton, not a perfect replication of whats is inside of you.) Notice how the bowling ball (head) is balanced on top of the flexible straw (spine) over the bowl (pelvis) and the stilts (legs and feet).

organs. It is surprising actually to see how similar we really are. Perhaps the biggest difference is that while we stand vertically, they are horizontal in relation to gravity. But the way in which we structurally deal with gravity is very similar. More on this subject later in the next issue.

The muscle system is designed to move the bones so that we can walk, sit, stand, and get on a horse. The nervous system runs the show. It tells us when, where, how and what to do with the muscles and bones. One of the amazing things about this system is how it detects differences.

For years people have been telling me to do less and slow down when I am working on something. It has always made me angry and frustrated to be told that all the time. I like to think fast and move fast. Finally, however, I have been given a good explanation of why it might be a good thing to slow down once in a while. It has to do with our ability to detect change.

In biomechanics there is something called the Fechner-Weber Law. What this law shows is that our nervous system detects change based on a ratio (i.e., one part flour to two parts water) rather than an empirical number (1,2,3, etc.). Here's how this works—if you are carrying 40 lbs. of books and someone added 1/2 lb., you will not notice the difference. But if they add 1 more pound you will feel the increased weight. This means it takes a 1:40 ratio of change before your nervous system detects the added weight. Less than 1 lb. and you will not feel a change.

If you are holding a feather and a fly lands on it, you willnotice the change if the fly is at least in the 1:40 ratio of the weight of the feather. If a speck of dust lands on the feather you will not feel it. Therefore, it is not how much weight you add but the ratio of change in weight that your nervous system can detect.

You did not add the same amount of weight to the feather as you did to the books, but you could feel a difference in both cases. Therefore, if you are flying around at the canter and trying to figure out if your head is balanced over your feet, it will take a much bigger event (like you separating from your horse) before you feel a change. If you rather start by walking slowly and observing the effect of a slight change in the position of your head in relation to your overall balance, it will take much less effort to notice differences. Then, when you go back to the canter, your nervous system will have made adjustments to your balance. You will have a better awareness of where the efficient place is for carrying your head even when going faster.

Gravity is the physical law that we have to consider consciously or unconsciously when determining the dynamically ideal rider position on the horse and/or the ideal position of the horse to carry a rider. We are given a skeleton to cope with the forces of gravity, which protects our internal organs, and to move, with the aid of muscles, this sack of fluids and bones (our body) around. Doesn't that sound elegant!

If the force of gravity is transmitted through the bones, then it takes a minimum of muscular effort to support and move us. But if the forces do not properly go through the bones, then the muscles are going to have to do a lot more work in order to keep us from falling down. When muscles are asked to do a job they are not designed to do (resist the force of gravity), we can wind up with all kinds of problems ranging from pulled muscles, to sore backs, tendon tears, injured shoulders, etc. So the most efficient plan is to have the skeleton do its job of being the supporting structure. This is true for both the rider and the horse.

"Gravity is the physical law that we have to consider consciously or unconsciously when determining the dynamically ideal rider position on the horse and/or the ideal position of the horse to carry a rider. "

In order to understand the function of the skeleton, I am going to simplify things quite a bit. Think of your skeleton as a bowling ball (your head) on top of a flexible straw (your spine) over a bowl (your pelvis) on a pair of stilts (your legs).

The Bowling Ball

Have you ever wondered how much your head weighs? Believe it or not, it weighs approximately 10–15 lbs. That is about the weight of most bowling balls. Next time you come across a bowling ball, pick it up and think about your head. Isn't it funny how you can carry around a 10 lb. weight without even noticing that it is there? However, if you have ever had whiplash, you become exquisitely aware of just how much it weighs because suddenly you can't carry it so easily. When you strain the muscles in your neck (as in whiplash), the weight of the head becomes very obvious. Otherwise you never really think about it.

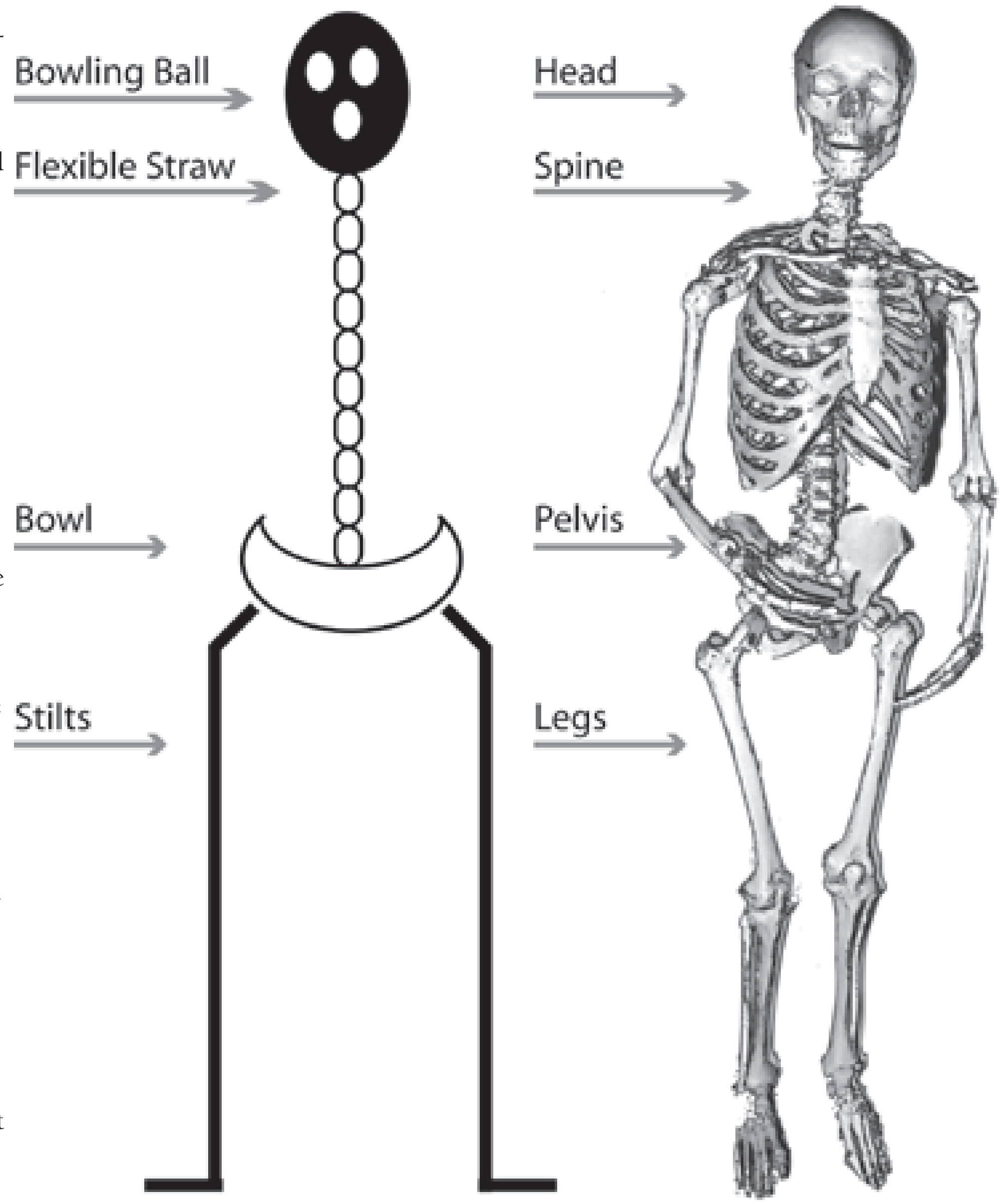
Now think about what is contained in this bowling ball. Just about all of your senses are here, not to mention your brain. You have your eyes for seeing, your ears for hearing, your nose for breathing, and your mouth for speaking and eating. All of these vital functions for life are located within this bowling ball on top of a flexible straw, over a bowl on a pair of stilts. It seems kind of silly to locate the vital life functions so far above the ground. Wouldn't it have been better if our brain were in our feet?

OK, we were designed with our head on top of our skeleton, so we are going to have to learn to deal with that. In many ways it makes us like those circus performers who spin plates on the top of sticks. Those performers have to be very careful not to let the plate get out of alignment. If they do, the plates crash to the ground and break. (You have to wonder how many plates they went through learning their craft.) Fortunately, we don't have to be quite so careful as those plate spinners.

A lot of unconscious effort and energy goes into keeping the bowling ball from hitting the ground. In fact, this consumes a tremendous amount of attention by your nervous system all the time. Think of it as the operating system of the computer. You don't really have to know anything about the operating system to run a computer. You sit down and type a letter or cruise the Internet, not giving a moment's thought to the operating system unless the computer crashes. Then you wonder what happened and you have no idea how to fix it because you didn't know anything about it in the first place.

The body's attention to keeping the head from hitting the ground is very much like the operating system. It is functioning all the time, making precise minute adjustments with every movement you make so that your head does not hit the ground. When the system is faulty, the entire body crashes and the results can be fatal. But if another part of the system gets injured (say you break your leg), you can still go on even if it is not quite as good. Until that moment when the head hits the ground, we rarely think about that is happening to keep the bowling ball up in the first place.

Your Skeleton: The simplified version



The Flexible Straw

I like to think of the spine as a flexible straw. It supports the bowling ball at the top. A flexible straw can move in a variety of directions just like your spine.

Your spine is made of a number of separate vertebrae. There are 7 cervical vertebrae that make up your neck, 12 thoracic vertebrae (which means there is a rib attached to each of these vertebrae) and 5 lumbar vertebrae known as the lower back. That means there are 24 separate bones that make up your spine (not including the fused vertebrae in the sacrum and coccyx) Between each vertebra is a joint. Joints are where two bones meet each other.

Having so many bones and joints is a really good thing if you want to move around. Joints allow us to have flexibility. If our spine were more like a stick with no joints, then the kinds of movement we could make would be quite limited. Imagine if your body were more like a pencil. If you were to fall over you would never be able to stand up again unless something came along and picked you up. But your situation would be precarious and the potential for falling over so great that you would spend most of your time lying on the ground rolling around rather than standing upright.

Some people actually move (and ride) as if there were no joints in their spine. Others ride as if certain parts of their spine were more like a stick and other parts were like rubber bands. Ultimately, the function of the spine is to move the bowling ball and hold it up. Each vertebra plays a part in the overall balancing and mobility of the entire system. Each of the joints between the vertebrae allows some movement so that the head and body can move three-dimensionally. The amount and type of movement in the vertebrae varies according to where it is in the chain. The neck has a tremendous amount of movement, the lower back very little. The thoracic spine is well designed for rotation.

Often you will hear people say "I am so stuck in my ____ (fill in the blank— hip, neck, shoulder, back, etc.) What does that mean? Does it mean that one particular joint is not moving or that the dynamic pattern of movement throughout the entire skeleton which comprises the end result of moving_______ (what ever you put there) is restricted? Often riders tell me they are stiff in their lower back, when in fact, the lower back is not where the problem is at all. It is typically that another part of their spine is moving too much so that the lower back does not have the opportunity to move as it could.

Ultimately, the entire spine needs to move appropriately in order for the head to move easily and efficiently. If one part of the spine is restricted, it will be reflected in other places and compensatory muscle patterns will exist. Ultimately, this will limit the movement of the head.

The Bowl

Your pelvis is the bowl, which is the counter-balance to the bowling ball (your head). This bowl can tip forwards and backwards or it can be placed underneath the bowling ball. On the bottom of the bowl are two little feet (your seat bones). These feet have sensors which, when sitting, tell the nervous system to lengthen the spine against gravity in order to make supporting the bowling ball easier. If these sensors are not in contact with the surface you are sitting on, the muscles must contract in order to support the bowling ball. Therefore, if your pelvis is tipped too far forward or too far back, you cannot properly support your head through the skeleton. The muscle system will have to act in order to prevent the head from falling. This will become the overriding activity of the neuro/muscular system rather than being available to respond to other requests. Therefore, it is important to have the feet of the bowl (your seat bones) in contact with the surface you are sitting on in order to balance the head efficiently.

A pair of stilts

When you are sitting, the bowl is the primary balancing agent for the head. When you stand up, you are now balancing your bowling ball over a pair of stilts (your legs). Fortunately, your stilts have hinges to allow for easier movement than the pair of stilts the circus clowns use. They have to swing their stilts to the side in order to walk forward. The hip, knee, ankle and toe joints allow you to swing your leg forward provided all your joints are in working order. In addition to the sensors on the bottom of your seat bones, you have sensors on the bottom of your feet. These provide the righting mechanism for remaining upright in relation to gravity when you are standing.

Summary

To recap so far, you have gravity acting on you all the time. Your skeletal system is designed to handle the force of gravity, protect your guts and allow you to move around. Joints provide mobility so that you can do things like bend down, get on a horse, drink a cup of coffee, etc. And the muscles move the bones. In simple terms your skeleton comprises a bowling ball (your head), a flexible straw (your spine) over a bowl (your pelvis) on a pair of stilts (your legs). The nervous system is constantly monitoring where your head is in space to make sure it doesn't hit the ground and, therefore, lose consciousness, which could be fatal to your survival. Any challenge to the balance of the overall system is going to require an adjustment by the neuro/muscular system to keep the bowling ball safe. Even if you aren't consciously aware of this process, it is happening all the time, running in the background like the operating system on a computer. If the skeleton is doing its job of transmitting the forces of gravity and through the bones, it will take a minimum of effort to move the unit.

If the skeleton is not in a good alignment with gravity, muscles will have to do the work of holding the bowling ball up, and therefore, overall movement will be restricted. This might be referred to as a brace. Muscular restrictions in the rider will inhibit the horse's movement. If we can restore the function of the rider's skeleton to the job of dealing with gravity, the muscles can stop holding and allow greater range of motion which makes it easier for the rider to follow the horse's movement.

In the next segment we will look at how this idea of a bowling ball, flexible straw, bowl and stilts pertains to the horse. In addition, I will discuss the counter-balancing effect of the pelvis and the head.

Gravity Part 2...

The horse's skeleton—a bowling ball, a flexible straw, a bowl and two pairs of stilts

In the last article, I discussed the fact that gravity determines how we move. The human body is designed to exist in gravity. The skeleton protects the internal organs and provides the structural ability for us to move around in gravity.

Horses are also subject to the law of gravity. They also have a skeleton by which to move around and to protect their internal organs. While there are tremendous similarities between the horse and the human, there are also some fundamental differences.

Vertical vs. Horizontal

Perhaps the most obvious difference between the horse and the human is that humans stand upright on two legs, while horses are horizontal, standing on four legs. I am sure that this is quite obvious to most horse people. Rarely do we want our horses to travel around on two legs.

The horizontal orientation of the horse provides a lot more surface area for gravity to act upon. Part of the increased area is due to the mere size difference, horses being a lot larger. Therefore, dealing with the effects of gravity is going to play a big part in the overall balance of the horse, without a rider on his back. Then consider what it must be like for the horse to cope with the additional 150—200 lbs. of rider and tack.

Second, when standing vertically it is clear that for humans the pelvis is underneath the head. It is much less obvious to see how the horse's bowl balances its bowling ball, since the horse's head can be about 6 feet away from his pelvis. We will look at this issue of balancing the horse's head with the pelvis in the next article.

In addition to the orientation of the two bodies, there are some differences in the bone structure between horses and humans. I actually think it is quite amazing to see how similar our two skeletons are. I will point out some of the major differences as we go along.

The bowling ball – the head

The horse's bowling ball is equivalent to ours — the head. While our bowling ball is round, the horse's bowling ball is oblong, and it weighs about 100—150 lbs. This is about 10% of the horse's total body weight!

However, the major difference between our head and the horse's is that the horse's head sticks out horizontally like a flag at the end of a 3' pole — the neck. This is unlike our head, which is placed above our feet. The horizontal orientation is going to require a lot more muscular work to carry the bowling ball around. Maybe that is why horses like to spend a lot of time with their head down grazing.

The way the spine and the skull meet in horses and humans is again similar and somewhat different. Where your head and spine meet is behind your nose and between your ears. Your top three vertebrae are above the line of your chin. The horse's bowling ball hangs forward and down from the spine more like a drop of water hanging from the end of a stick. When you look at it from the perspective of the skeleton, it is going to take a particular alignment in order to hold the head up effortlessly.

The juncture of the skull and the first cervical vertebra is again quite similar. There are two ridges on the back of the skull (horse) or bottom (human) of the skull. These ridges fit into shallow cups on the first cervical vertebra. This allows for a nodding motion of the head. When the entire skeleton is functioning to counterbalance the head, the poll will be the highest point, and in collection, the plane of the horse's face will be vertical if this joint can move freely. When you are balanced through your skeleton, your head will be well balanced over your feet without the chin tucked in or sticking out.

As in humans, most of the horse's senses are located in his head along with the brain. The horse's eyes, ears, nose and mouth are located in the head. Just like in humans, the horse's nervous system is designed to keep the horse from hitting the ground. Loss of consciousness and/or death will occur if the horse is not capable of balancing the head. Therefore, the horse will not be relaxed or able to listen and respond to your commands if there is something preventing him from balancing and protecting his head and using his senses (ears, eyes, nose) to perceive his environment.

The flexible straw – the spine

The horse's flexible straw or spine is made up of 7 cervical vertebrae, 18 thoracic vertebrae, 6 lumbar vertebrae, 5 sacral, and a bunch of tail vertebrae (around 16). This means that horses and humans have the same number of vertebrae in their necks. For that matter, so do giraffes. On the other hand, owls have 22 vertebrae in their neck, which is why they can turn their head and see all around without moving their eyes.

The way in which the cervical vertebrae move is also similar in horses and humans. The movement of the joint where the bowling ball meets the spine (the skull and the first vertebra) is known as the atlanto-occipital joint, the poll in the horse. The primary movement at this joint is a very small "yes" nod. The junction of the first and second vertebrae (atlas/axis) allows the head to turn. In humans this is a left/right movement or the "no" movement of the head.

In horses, turning the head is also a left/right movement. But, since the horse's head is hanging horizontally, the movement is expressed a little differently. If the head is held at wither height, the turning movement in the chin is to the left and up to the right and up. The ears become unlevel when the horse turns his head left and right at the junction of the first and second cervical vertebrae (C1/C2).

The joint between the second and third vertebrae (C2/C3) allows us to tip our head to the side. This movement brings one ear closer to the shoulder on the same side. In the horse this movement is associated with the horse turning his head slightly to the left or right with the ears remaining level. This allows you to just begin to see the horse's inside eye while riding.

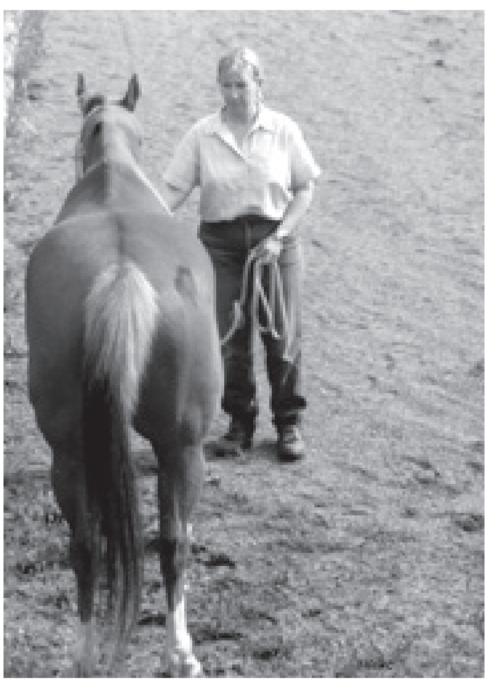
The remainder of the cervical vertebrae add a larger range of motion in turning, tipping and nodding. However, full range of motion for these movements is not limited to the cervical vertebrae. The remainder of the spine also plays a part.

Horses generally have 18 thoracic vertebrae (vertebrae which have ribs attached) and 18 pairs of ribs (Arabians can have 17). This part of the flexible straw goes from the chest, between the front legs, to the loin area. The area of the rib cage starting behind the shoulders is where the horse is capable of carrying the saddle and rider.

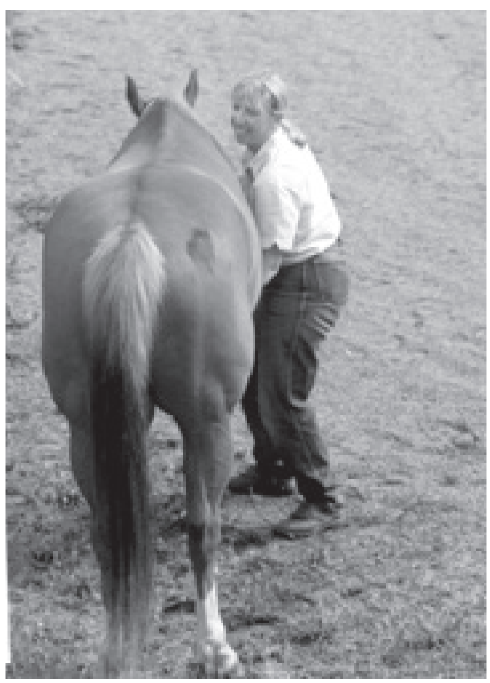
It is very important that the saddle spans the rib cage properly or the horse can wind up with tremendous back pain. The withers are actually tall bony processes called the dorsal processes, which stick up vertically from approximately the 4th-10th thoracic vertebrae. It is extremely important that the dorsal processes are free from any contact by the saddle at all times. This bony area is unprotected by muscle. It would be the equivalent of someone rapping on your shins if the saddle tapped on the withers.

The saddle should contact an area no longer than the distance from behind the shoulder blade to the last rib. (The saddle can be longer, as many western saddles are; it just cannot contact the loins.) Otherwise, pressure will be applied to the lumbar spine (the next part of the flexible straw) or on the shoulders themselves. These areas are not designed to bear weight. If the saddle is too short or does not fit properly, the rider's weight will be unevenly distributed over the rib cage. This can restrict the thoracic spine and the overall function of the flexible straw.

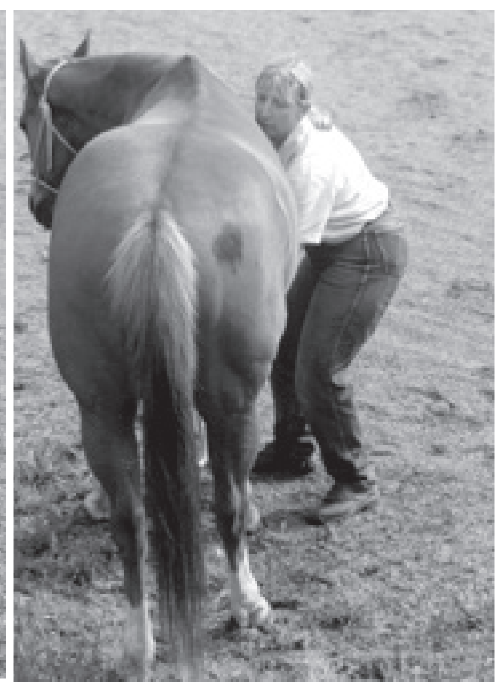
In the horse there is no bony attachment of the ribs or thoracic spine to the front legs. This is a major difference between the horse and human skeletons. We have a collarbone, which provides a bone-to-bone connection between the shoulder girdle and the rib cage. The two meet at the sternoclavicular joint (sterno = sternum and clavicle = collar bone). (This is the area where Patrick Swezey touched Demi Moore while she was sitting at the potting wheel in the beginning of the movie "Ghost.") You can feel this on yourself. Simply find the notch at the top of your sternum and then go slightly to either side. If you raise and lower your shoulder, you will feel a slight movement here. Then trace the collarbone over to the shoulder and move your elbow



Preparing to do a belly lift.



Giving Andy a belly lift



Bending to the left. Notice that the spine has incurved to the left and the back has lifted.

in and out. You might be able to feel where the other end of the collarbone attaches to the shoulder girdle.

When there is no collarbone, as in the horse's case, the muscle system keeps the rib cage suspended between the front legs. Think of the rib cage as lying crosswise in a hammock with two trees holding the ends of the hammock up on the right and left. The trees are the front legs. The rib cage floats in this sling of muscle. Therefore, the horse's withers can go up or down between the pillars formed by the shoulders.

The muscles of the sling lift the rib cage, spine and withers. This is important in collection. If there is a kink in the straw (due to pressure on the withers, poor saddle fit, back pain or bad riding) that restricts this part of the spine, the sling muscles will not be able to lift the withers. A kink will restrict the flow of energy through the straw and block the horse's movement in the back. Of the three basic gaits, the movement of lifting or not lifting the withers is most noticeable in canter. A horse that can freely lift his withers will have a round canter. The horse that cannot lift its withers will have a flat, rushing, or heavy on the forehand canter.

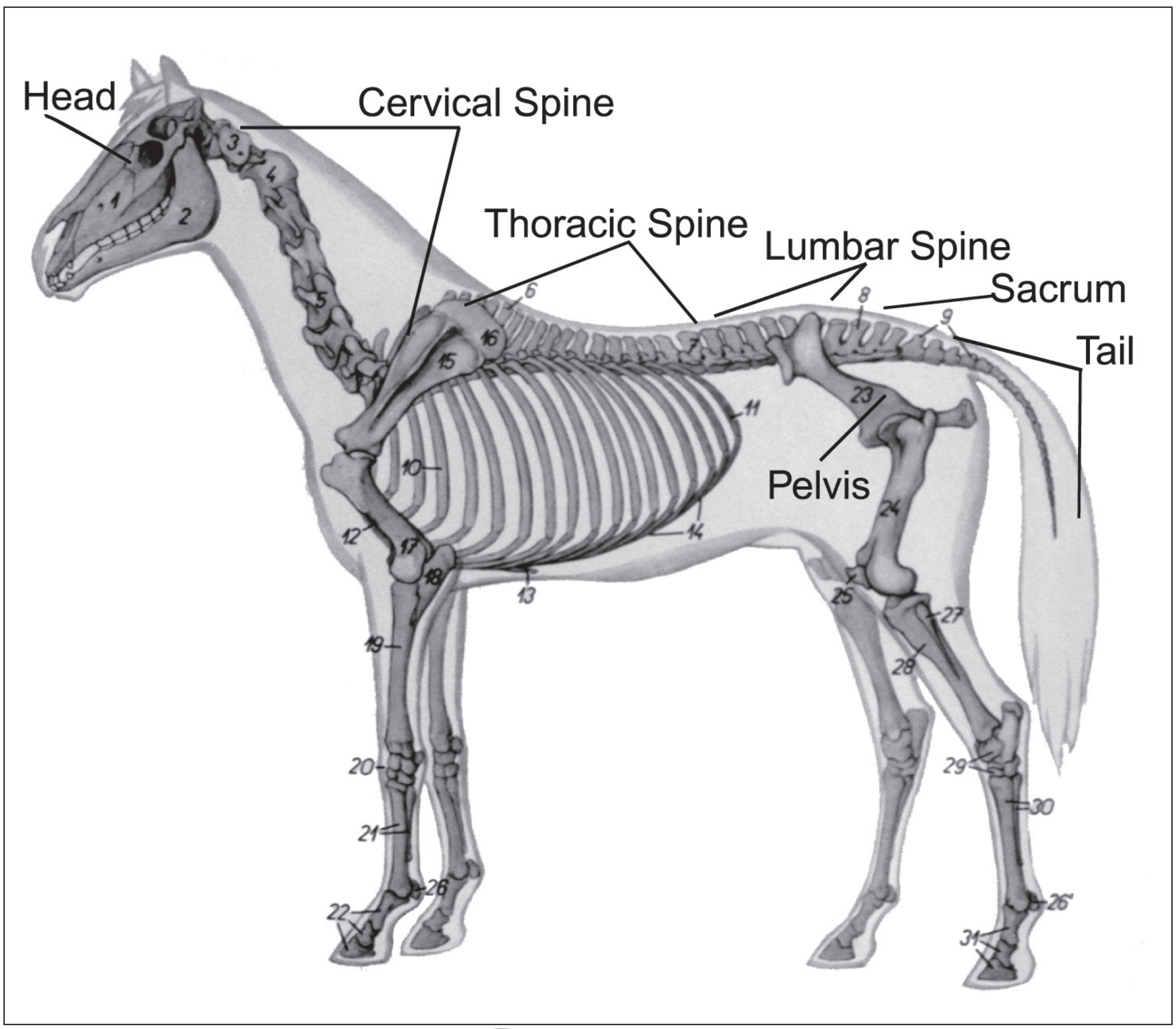
The thoracic spine is also very important when asking a horse to bend. Here I am referring to bending as in incurving the horse on a circle either right or left depending on the direction in which you are riding. This is somewhat equivalent to side bending in humans, i.e., reaching down with your right hand towards your right foot without leaning forward or back. People can side bend a lot more than a horse can.

In order for the horse to bend, he has to be able to flex the back, rotate the rib cage outward, curve the spine and close the ribs on the inside of the bend while opening the ribs on the outside of the bend. This three-dimensional movement will make room for the hind leg to step underneath the horse and provide an upward thrust rather than a forward thrust from the hind leg.

If the neck portion of the flexible straw is free, the neck will express the bend. Many riders attempt to create a bend in the horse by pulling the head around to the side. While you can create a proper bend this way, many times riders wind up only moving the neck and not getting the thoracic spine to incurve. If the thoracic spine does not bend correctly, the horse will have a false bend in the neck.

Suffice it to say that if you can pick up the inside rein and feel the bend go through the entire horse, most likely the spine is unobstructed by tension. But, if there is a kink in the flexible straw, you may only be taking the neck around when you pick up on the rein, if that. (See photos for back lifting and bending.) In other words, bending occurs throughout the entire spine including the thoracic spine, not just in the neck.

The next part of the flexible straw is the lumbar spine. There isn't a lot of rotational movement in the lumbar spine. The lumbar spine is more like your two fists butted up against each other with the knuckles meshing. However, horses are very capable of rounding or flexing the lumbar area of their back. In fact, the lumbosacral joint has the greatest range of flexion in the lumbar spine. But horses can't flex the lumbar spine if there is any pres-



sure on this area of the back. The most common impedance is a saddle that is too long for the horse, or a rider who is sitting on the cantle of the saddle. Restricting movement in the lumbar area of the spine will prevent the horse from bringing his pelvis underneath as occurs in collection.

In order for the horse to balance the head through the skeleton, the entire flexible straw needs to move. If there is any part of the spine that is restricted, it will inhibit the horse's ability to carry his head effortlessly. Think of it as a series of dominos. If one piece is not properly lined up, it will affect the entire chain and the overall outcome — if the dominos are lined up correctly, knocking the first one down will continue to the end of the chain even if they are lined up around a curve.

The horse's flexible straw continues on past the sacrum to the vertebrae in the tail. Horses have a lot more tail bones than we do! Again, it is important that these vertebrae move freely because a kink in the tail can affect the fluidity of the overall vertebral column.

The bowl – the pelvis

Perhaps this is the piece of the skeleton that least resembles the human counterpart. Your pelvis could be equated to a bowl with two feet on the bottom, while the horse's pelvis is horizontal, with his feet (the point of the buttocks) sticking down toward his back end. This is the back part of the pelvis. The hips are on the side.

The top of the pelvis in humans is called the iliac crest. The counterpart in the horse is the point of the hip, the prominent bump just back of the loin area on the side. This can cause problems when talking about the hips because many people think their iliac crest is their hip when, in fact, it is not. The only place that is actually the hip is the hip joint itself where the ball at the top end of the thigh or femur meets the socket in the pelvis.

Where the spine and the sacrum meet is called the lumbosacral joint (lumbo = lumbar spine and sacral = sacrum). The tail bones are attached to the end of the sacrum. The pelvis is made of two halves with the sacrum firmly held together with very strong ligaments between the back of the two halves. The junctures of the sacrum and each half of the pelvis are known as the sacroiliac joints (sacro = sacrum and iliac = top of the pelvis). Where the bottom of the two halves of the pelvis join is the pubic arch.

In humans the sacrum is like a pendant at the base of the flexible straw. It is triangular-shaped like a slice of pie. The horse's sacrum is elongated rather than triangular and runs horizontally. The croup is the angle formed by the whole sacrum beginning at this joint. Sometimes this area becomes damaged and sticks up. This is often referred to as a "jumpers bump."

The shape of the pelvis is quite different in the two species; however, it serves the same function. The pelvis is the counterbalance to the head. This is also where the hip joints are located. When the horse pushes off the ground with the back legs, the force is transmitted through the hip joint to the pelvis and then through the spine to the head if the skeleton is functioning correctly.

Two pairs of stilts – the legs

Instead of having one pair of stilts to walk on as we do, the horse uses two pairs of stilts. Our arms are their front legs and our legs are their rear legs.

In the front legs, as I have already mentioned, one major difference between the horse and human skeleton is that the horse does not have a collarbone. In other words he does not have a bony attachment of his shoulder to his rib cage. However, his shoulder blade, upper arm and elbow are quite similar, differing in the proportion of the bones.

When we get below the elbow, things are very different. We have two bones in our forearm, radius and ulna. This allows us to rotate the forearm. Rotation would be a bad idea for the horse to have below the elbow. Fortunately, the ulna is almost nonexistent thus eliminating this possibility.

Next is our wrist. This is the equivalent of the horse's front knee. Going down from there we have 5 bones in the hand known as metacarpal bones. The horse has almost eliminated all but one, the cannon bone. The remains of the metacarpals are the two splint bones and possibly the chestnut and ergot. Finally, the horse stands on the equivalent of our middle finger, which has become the long pastern, short pastern and coffin bone.

The differences in the hind legs compared to humans are similar to the horse's front legs. The horse has a very short thick bone, the femur, which is equivalent to our thighbone but proportionately much shorter. The stifle is the equivalent of our knee. We both have a patella or kneecap.

Below the stifle things change again. We have two bones in the lower leg, tibia and fibula. The horse essentially only has one, the tibia. There are remains of the fibula, but they do not go very far down the fibula before they end.

This is a good thing. If the horse had a functional tibia/fibula it would allow rotation between the stifle and the hock. I am not sure the horse would be able to carry us if that happened!

The horse's hock is equivalent to our ankle. Sometimes the ankle is referred to as the gyroscope for the body in humans. Hocks are certainly very important in horses. They need to be well shaped, strong and not twist in order for the horse to propel himself well from the hindquarters.

Below the hock is the cannon bone, which, again, is the middle bone or metatarsal of the foot. The fetlock is the knuckle at the base of your toe or finger where it joins the palm of the hand or foot. The hind pastern and hoof are the three bones of your middle toe. The remaining toes again are rudimentary structures similar to the structures in the front leg.

So there you have it: the bowling ball (the head), the flexible straw (the spine), the bowl (the pelvis) and two pairs of stilts (front and rear legs.) Next time we will look at how the bowl counterbalances the bowling ball for both horses and riders.

The Equine Seesaw:

How the horse can horizontally counterbalance the bowling ball

Illustrations by Fran Loftus

It is generally accepted that a riding horse's drive or engine is the hindquarters. Ideally when ridden, the horse will push forward and brake from behind rather than pull or brace with the forequarters. However, horses are often ridden in such a way that the power of the hindquarters is not harnessed.

In many cases incorrect riding, training and poor horsemanship skills are the cause for not accessing the power in the horse's back and hindquarters. This is most often due to a lack of understanding of physics (in particular the law of gravity), equine biomechanics (how the horse moves), saddle fit and human biomechanics (how people move).

In the first part of this series I discussed gravity as the overriding law that determines how everything on Earth moves. Mammals (in this instance particularly humans and horses) have a skeleton to support them in gravity and joints which allow the bones to articulate so they can move fluidly. However, fluid movement is not something that simply happens. Physical asymmetries, habits and injuries play a major role in how efficiently both humans and horses move.

In the second part of this series I compared the basic similarities between the horse and human skeleton. Both were placed in a very simple model of a bowling ball (the head), a flexible straw (the spine), a bowl (the pelvis) and either one or two pairs of stilts (the legs).

Further, I discussed that while people stand upright, the horse is horizontal. Our head is conveniently placed above our pelvis, making it ideal for balancing a bowling ball on a flexible straw with the bowl over a pair of stilts. However, the horse is horizontal with the head and pelvis about 6' apart. Therefore, balancing the bowling ball with the pelvis over two pairs of stilts is not nearly as obvious as it is in humans.

In this article I am going to briefly discuss how people balance themselves in movement and then present a simplified view of different ways the horse can function. I will use the analogy of a seesaw presenting five different scenarios. If you watch the way horses are ridden, you might recognize some or all of these possibilities. However, there is only one effortless and efficient way the horse can counterbalance its head and a rider

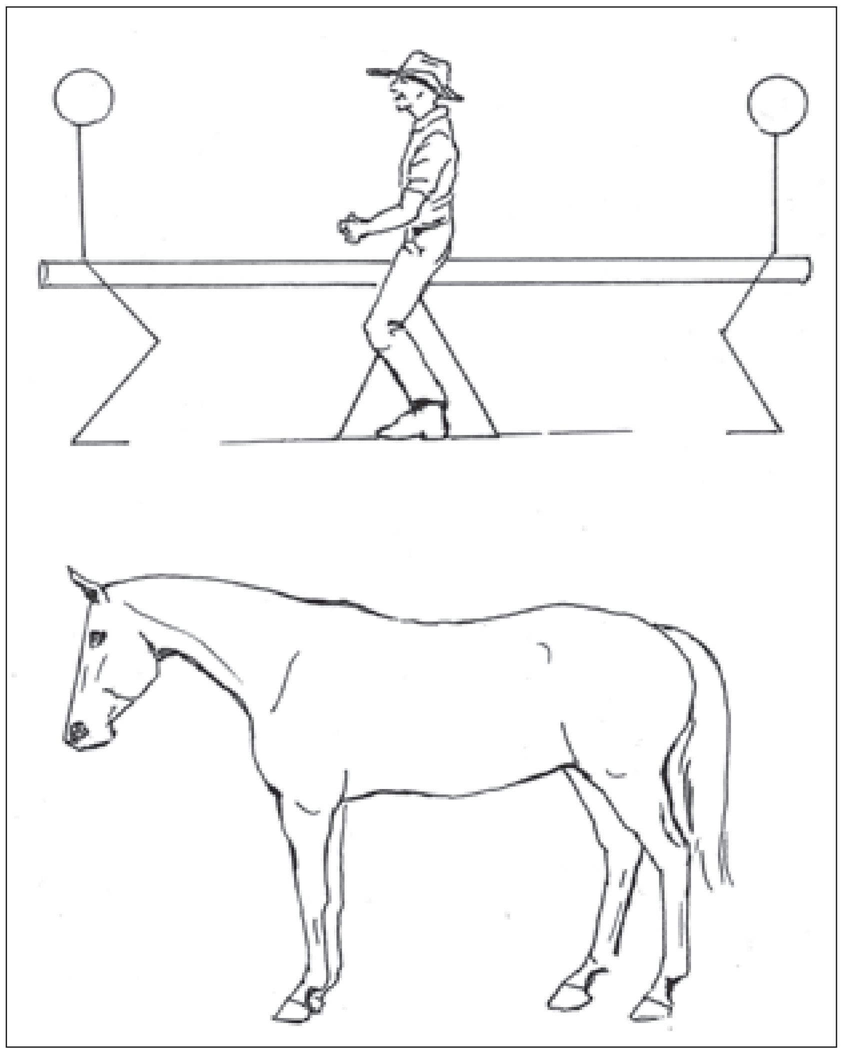


Figure 1. When the horse is in a level frame, both stick figures are sitting on the ends of the seesaw with their feet on the ground and a soft bend in their joints. The weight is essentially equal at the two ends and neither figure is trying to force the other one down or up.

that allows the greatest freedom of movement with the least amount of wear on the system (both horse and human).

This place, when both horse and human are aligned with gravity, is where movement becomes graceful, harmonious and elegant. This is where the mystical "oneness" between horse and human occurs. The magical dance-like quality of the horse and rider moving together appears to defy gravity. It is not such a mystery when one understands how the magician does the trick. It is the result of both beings moving together in self-carriage within gravity. Hopefully this article will further your understanding about what needs to happen in order for you to ride in harmony with your horse.Moving forward while carrying your head efficiently

To begin, I want you to get a sense of how you move. As I have said before, the horse has to deal with your alignment and function in gravity before it can respond to your requests. To quote Arthur Kottas-Heldenberg, the Chief Rider of the Spanish Riding School in Vienna, now retired, "If the rider is correct, the horse will be correct." Therefore, the more conscious you are of your own alignment and balance, the easier it will be for your horse to carry you.

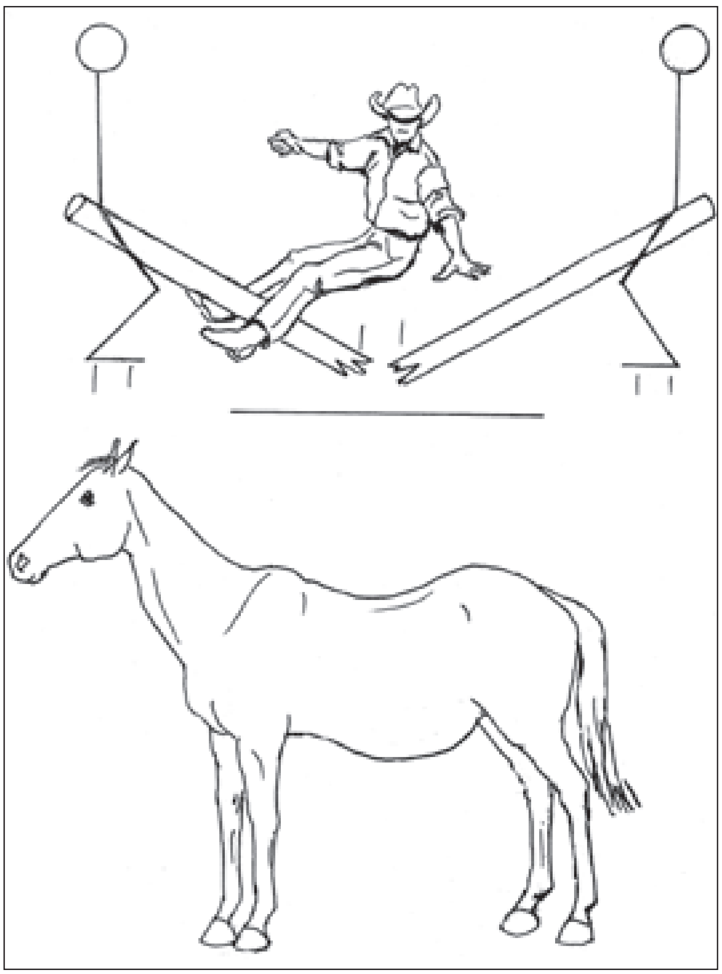


Figure 2. When the board is broken at the fulcrum then the board can no longer transmit information from one end to the other, nor can the board support the horse's head.

The human bowl (pelvis) has to be balanced in order to minimize the muscular effort required to carry our 10 to 15 lb. bowling ball (head) around. If the pelvis is tipped too far forward or too far back, greater muscular effort is going to be required to carry our head than if the bowl is level (pelvis level with seat bones pointing down rather than forward or back). Once the bowl is tipped, the stilts are restricted. Try standing with your back arched (pelvis tipped down in front), round (pelvis tipped too far up in front) and neutral (pelvis level) to feel the difference and the amount of muscular work required between these different positions. Walk around in these positions and notice what happens to your legs. You will find that you cannot move your legs very easily unless the pelvis is balanced.

Here is an interesting exercise to find out when your pelvis is level, which Lucile Bump once showed me. Get a large mixing bowl from the kitchen, preferably one that has a flat area on the bottom. Place a round object such as a small ball in the bowl. While standing, hold the bowl with both hands against your abdomen with your arms against your sides.

Now walk and notice if the ball goes to the front of the bowl, the back of the bowl or stays in the middle. Change the angle of your pelvis and watch what happens to the ball in the bowl. (Better yet, keep your head up and have someone else look in the bowl since dropping your head to see the ball in the bowl will influence where it sits!) As you arch or round your back, the ball in the bowl will mirror the change in you. The small ball will roll toward the front of the mixing bowl (pelvis tipped forward and down, seat bones pointing out behind you), back of the bowl (pelvis tipped back, seat bones pointing too far forward) or middle of the bowl (pelvis in neutral).

Once you have found out when your pelvis is neutral, put the bowl and ball away and find a lightweight flat object like a 1ft. square piece of Styrofoam, cardboard or hardcover book. Place this on top of your head (yes, we are going back to charm school!). Remind yourself of the African women who balance all kinds of objects on their heads. What alignment of your head do you need to keep the object from falling? Test out looking down or up, or tilting your head to the side. Where does your head need to be to keep the "basket" on top?

See if you can walk around without the "basket" falling off your head. Is it as easy as the African women make it look? Go slowly and feel how much you need to use your hips, knees and ankles to absorb the movement of walking so that you don't disturb the object on your head. Can you squat down a little and stand back up again without losing your "basket"? Try taking longer strides, shorter more collected steps, lowering your self a little with each step by bending your joints and, if you are really brave, trotting a few steps. If you stiffen the legs even slightly what happenst to the rest of the system? What do you have to do to keep the "basket" on your head?

Find out what happens if you arch or round your back slightly. Notice that you have to keep both your back line and your front line long in order to balance the object. If you slump slightly, the object on your head will fall off. If you arch slightly, it will also fall off. For the most part, there is only one alignment of the flexible straw that will allow you to keep the object on your head.

Therefore, in order to keep the book balanced, you need to maintain the alignment of your bowling ball (head), flexible straw (spine), bowl (pelvis) and use the joints of your stilts (legs) to move you around. The alignment of the bowl and flexible straw is necessary to transmit the push from the legs through to the head in order to carry you forward. You are now moving from your hindquarters!

The Equine Seesaw

It is not as easy to put a book on top of the horse's head in order to see whether it is carrying its head efficiently. In order to understand equine skeletal alignment I like to use a seesaw analogy. This simple concept can illustrate different possibilities for the ways horses move. Even this analogy can get complicated very quickly. Please bear in mind that the seesaw is not entirely accurate, yet it does help to convey the basic idea.

To begin, let's start with the components of a seesaw and how they relate to the horse. A seesaw is made up of a board, a fulcrum and children, which add weight and drive the seesaw up and down. The board is equivalent to the flexible straw or horse's spine mentioned in previous articles. The topside of the board represents the top line of the horse. The underside of the board represents the underline of the horse. Therefore, the top line and underline must work together to stabilize the spine.

The fulcrum is the object the board sits on, creating a pivot point. This is the equivalent to the center of gravity of the horse, which is located approximately at the 11th – 12th rib. The children (stick figures in the drawings) represent the weight located at either end of the spine, the head and pelvis, as well as the legs of the horse.

You could move the fulcrum closer to one end of the board or the other. For now the board will remain centered over the fulcrum. Also, the rider will stay sitting on the board over the fulcrum. Keep in mind it is possible to have the fulcrum and the rider in different locations along the board. One cause for this is the saddle.

I am not going to specifically discuss saddle fit and how it affects the horse. However, it is important to realize that incorrect saddle fit can negate this entire analogy! If the saddle is too far forward or back, the rider's weight is not over the fulcrum. This will definitely affect how the spine functions.

While the spine of the horse needs to act like a board to transmit energy, it must remain flexible. Therefore, anything that impinges on the function of the spine blocks the transmission of force through the vertebrae. When the saddle and rider are over the center of gravity with the weight properly distributed along the rib cage, the spine can act like a board.

If the pressure is not evenly distributed on the rib cage, the spine becomes unevenly inflexible. It is like breaking the board into little pieces and trying to scotch tape it together. It will never be strong enough to bear weight. Often horses with splintered boards will have "traveling mystery lameness" as they try to accommodate the weight of the rider on their back. Therefore, correct saddle placement and fit are critical to the spine acting like a board.

In the following illustrations the stick figures on either ends of the seesaw are going to have two roles. The upper portion of the stick figure to the left represents the bowling ball (head). The legs represent the front legs (one pair of stilts). The upper portion of the stick figure on the right represents the pelvis (bowl). The legs of this stick figure represent the hind legs of the horse.

When the spine acts like a board

When the horse is in a level frame, both stick figures are sitting on the ends of the seesaw with their feet on the ground and a soft bend in their joints. The weight is essentially equal at the two ends and neither child is trying to force the other one down or up. (See Figure 1.) They could gently seesaw a little bit one way and then the other, lowering the front end of the board and then lowering the back of the board, but it is easy to return to the middle.

Essentially, the board goes unnoticed because there is no

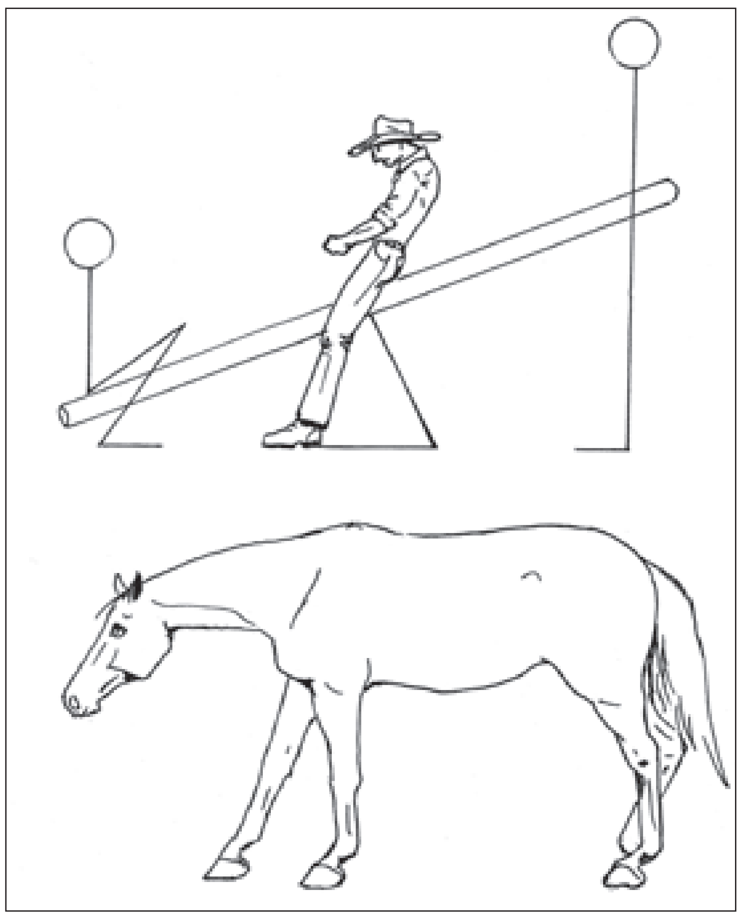


Figure 3. Ever been on a seesaw and had a mean person at the other end? They stiffen their legs and won't let you up off the ground. This is the equivalent of the horse that is built downhill or is very stiff in the hindquarters.

loss of connection from the front to the back. It instantly transmits the alternate closing and opening of the leg joints at each end. The rider in the middle feels a slight swing as this is happening and the ride is fairly smooth. Coming to a halt, the board remains level and balanced with soft joints in the legs.

The pelvis balances the weight of the horse's head. This is similar to the above example of you moving under the object on your head. You might use the expression that the horse is "through the back" because any change at either end transmits through the board instantly. It is the ability for the horse to transmit signals through the entire system from the rider's hands to the hindquarters and from the hindquarters to the horse's head that allows for immediacy of response to our aids and requests. Essentially, the lines of communication are open and response time is instantaneous because there is no loss of connection from back to front and vice versa.

A horse can be "through the back," immediate transmission of information from one end to the other, in any discipline and in any outline from a pleasure horse to Grand Prix Dressage. When the spine acts like the board of a seesaw, the horse is "through the back."

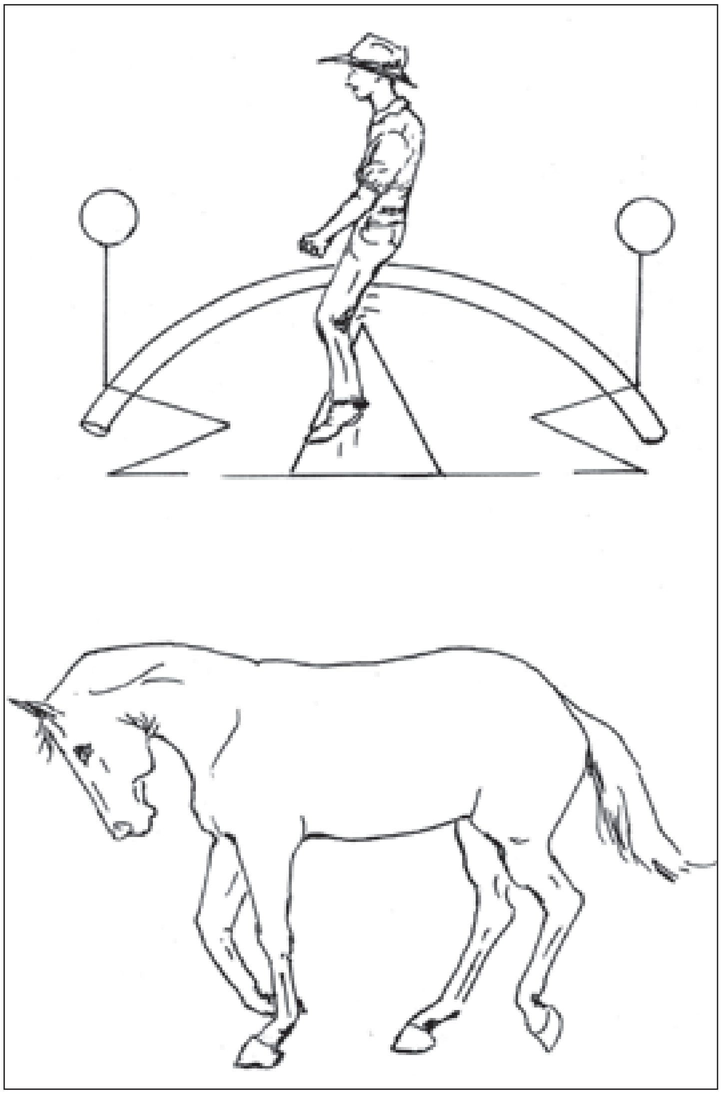


Figure 4. In this case the board is overbent and "behind the bit." While it may seem that is a better choice than the broken board, the skeleton is still not carrying the head efficiently.

When the board is broken

When the board is broken at the fulcrum, the board can no longer transmit information from one end to the other, nor can the board support the horse's head. (See Figure 2.) There are numerous reasons why the board might be broken. Again, poor saddle fit is often the culprit. Other reasons for this scenario run the gamut and include anything that causes back pain. The more uncomfortable the horse's back is, the more he will attempt to get away from the pain, deepening the pattern.

Essentially, the board is snapped at the fulcrum so that the ends wind up in the air. As the middle goes down, the two ends go up. The horse is said to be high-headed or "above the bit," but the cause for that is often the broken board. The pelvis winds up tipped in the equivalent position of forward and down for the person (see above). The pelvis cannot support the head due to the broken board. (Remember what it felt like in your neck when you arched your back?) You can't generate thrust from the back end, only speed because the horse can't lift the back. It is much more difficult to raise the front end (as in jumping) when the board is broken.

When the board is broken, the front legs wind up bearing most of the horse's weight. This results in horses being heavy on the forehand, difficult to stop, turn and start because they are struggling to carry their head. The under neck muscles have to work hard to hold the head up because the spine is no longer able to do the job. The stilts (legs) become stiff and rigid in an attempt to support the weight at the ends of the broken board. Often these horses rush forward as they attempt to "catch" their head with their front end (think plate spinning on a stick leaning forward – you have to run to stay under it).

Many riders attempt to correct the situation with stronger bits to stop the horse and gear to pull the head down. However, if the board remains broken, you will only achieve the "appearance" of correct head position. The rider's weight will further compound the problem, since the horse cannot bear very much weight with its back in this position.

The bully at the back end of the board

Ever been on a seesaw and have a mean person at the other end? They stiffen their legs and won't let you up off the ground. This is the equivalent of the horse that is built downhill or is very stiff in the hindquarters. (See Figure 3.) The board can work just fine and the fulcrum is in place, but the head is driven down to the ground because the hind legs won't fold. The riders have to lean back or arch to prevent themselves from sliding down the board toward the front end. This puts further pressure on the horse's forehand and makes it even harder for the horse to lift its head. The majority of the horse's weight is on the forehand, which puts a lot of strain on the front legs.

The overflexed board

This is the opposite of the broken board demonstrated in Figure 2. (See Figure 4.) In this case the board is overbent and "behind the bit." While it may seem that is a better choice than the broken board, the skeleton is still not carrying the head efficiently.

When the board is overflexed the top line is too long and the underline is too short. It is like walking around constantly contracting your abdominal muscles. This pulls your head forward and rounds your back. Now hold that crunch and try to lift your head. You have to strain at the back of your neck because the spine is overly flexed. In order to lift your head, you need to straighten your spine. You may have accomplished lowering the hindquarters in an attempt to get more pushing power, but it is lost because of the restriction placed on the board and front end.

Often you see horses vacillate between above and behind the bit, bypassing the middle ground ("on the bit" or "on the aids"), because they can't carry their head comfortably in either position. Again, discomfort is often the cause. The horse might be avoiding a bit which is too strong, or a rider who is heavy handed. Horses are often pulled, jerked or forced into a frame rather than shown how to carry their head easily. Horses ridden behind the bit can be seen in any number of disciplines by all levels of riders. Again, the horse will only be able to carry its head effortlessly if we do the same thing and show it how to achieve this middle ground.

Lightening the Forehand—collection

You cannot have true collection unless the horse has achieved the ability for the spine to function like a board. Collection means that the hindquarters take more weight and can therefore lift the front end up. (See Figure 5.)

Think of a seesaw with even weight at both ends—it would be level to the ground (Figure 1.). Then add a second person at the back end. The front end automatically goes up; the forehand of the horse lightens. This can only be accomplished when the board acts solid. If it is broken, the two ends don't affect each other. If the joints of the back end are stiff, adding more weight won't change the way the front end is being driven into the ground. If the board is soggy, more weight at the back doesn't make any difference in lifting the front. Only when the horse's back acts like a seesaw can the addition of weight at the back end lift the front end.

Shifting the weight back is actually achieved by bringing the hind legs further under the horse's body, which can only be accomplished by suppling the joints (bending the stilts). We will leave that discussion for future articles.

Suffice it to say that if the horse's skeleton (bowling ball, flexible straw, bowl, and two pair of stilts) is not able to properly align in gravity, the muscles required to drive the horse from behind are engaged in holding the head up. Therefore, the legs are unable to move under and forward toward the center of gravity, making true collection impossible. When the counterbalance of the pelvis (bowl) works through the horse's back (flexible straw acting like a seesaw) to lighten the front end and carry the head (bowling ball), the coiling and uncoiling of the hind legs can provide the thrusting and braking power necessary for fast, immediate responsiveness. Gravity appears to be defied when the horse uses its skeleton to support itself in movement. If, when combined, we both use ourselves in "self-carriage," together we will move as a partnership in harmony.

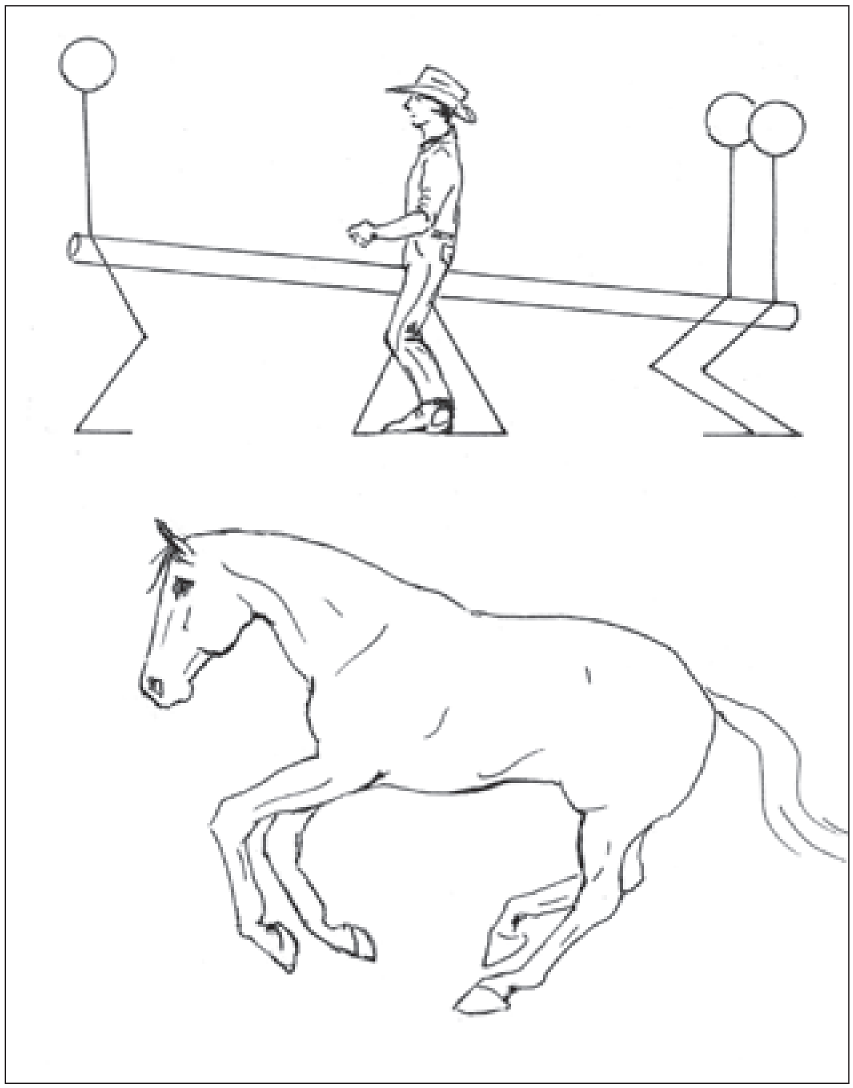


Figure 5. You cannot have true collection unless the horse has achieved the ability for the spine to function like a board. Collection means that the hindquarters take more weight and can therefore lift the front end up.

If only we had X-ray vision...

A closer look at how the horse functions

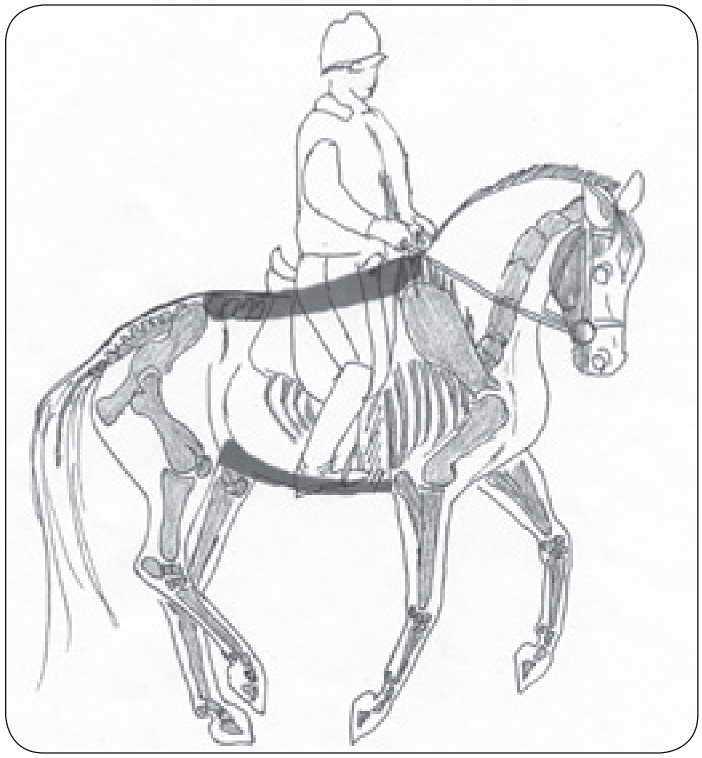
Previously I have discussed a simplified model of looking at the rider's and the horse's skeleton using the analogy of a bowling ball (the head), a flexible straw (the spine), a bowl (the pelvis) and one or two pairs of stilts (human or horse, respectively). In the last article I presented the concept of a counterbalance using a seesaw image to illustrate how the horse can carry its head easily.

It is readily apparent in humans that if we align our skeleton vertically, our bones in a standing position support our head. This is not so apparent in the horse, since the horse stands horizontally. Therefore, in order to efficiently carry his head, the horse has to use his skeleton in such a way as to counterbalance the head with the pelvis, which is about six feet away.

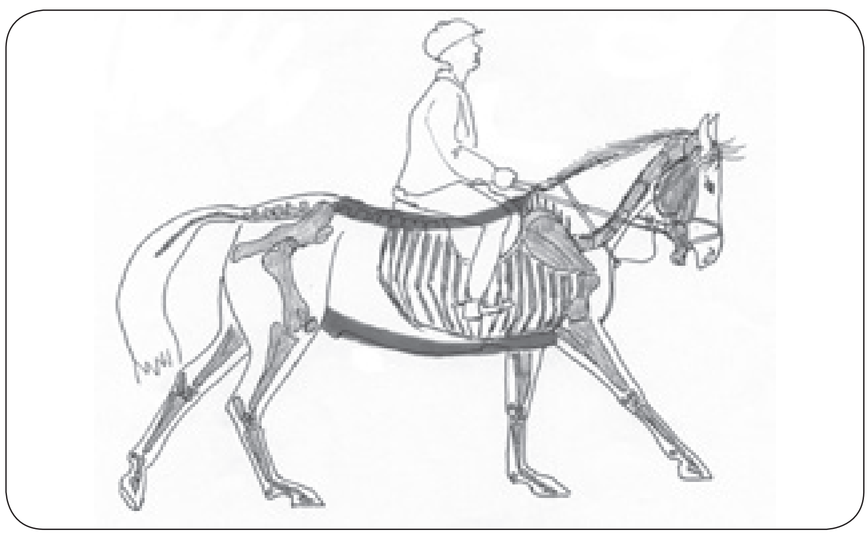
In the last article I presented several seesaw models as examples of how horses can be ridden. Each way affected their ability to carry their head. The easiest way is when the hindquarters lower in order to raise the front end up.

Ultimately, the overall quality of movement is governed by the ease with which the head is carried. Since gravity is acting on us at all times, our ease becomes a function of how well we can move in gravity. Freedom of movement is determined by how little effort is required to carry our head.

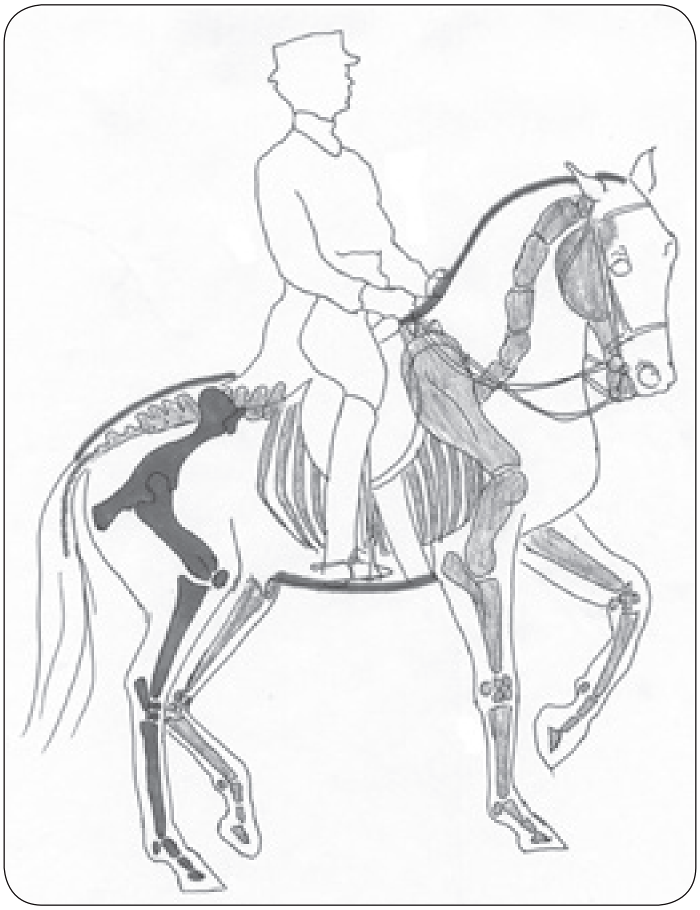
If our skeleton is aligned in a manner that makes carrying the head easy, then we (both horse and human) have more time, energy and ability to focus our attention on other things (i.e., jumping over a large obstacle, canter pirouettes or chasing a cow). If we are constantly struggling to balance our head, we are less available or capable to move when and where we like because we must first deal with the issue of balancing the head. Therefore, harmony, grace and beauty are lost because both horse and human are struggling with the basic issue of survival—not letting their head hit the ground.



1a. The horse has lengthened his topline and underline. Notice the wedge-like shape formed between the two lines representing the distance from the wither to the croup and the elbow to the stifle.



1b. This horse has hollowed its back and dropped his sternum. Notice that the topline is concave and shorter than the underline. Also notice that the hind legs are trailing. The horse is on the forehand and the weight of the rider seems to be causing the back to sink further down.



2a. Notice the angle of the pelvis. The seat bone (point of the buttocks) is pointing down toward the ground. There is a sense that the horse has good support coming up from the foot on the ground into the hip joint and pelvis.

2b. The angle of the pelvis is tipped up and out. The seat bone is pointing back rather than down. The point of the hock and cannon bone of the hind leg is in line with the seat bone behind the horse rather than underneath the horse. There is no feeling of support from the hind leg. Notice the angle of the joints in the hind leg are more closed than in 2a. The sense is that the weight is coming down into the hind leg rather than the horse pushing up through the hind leg.

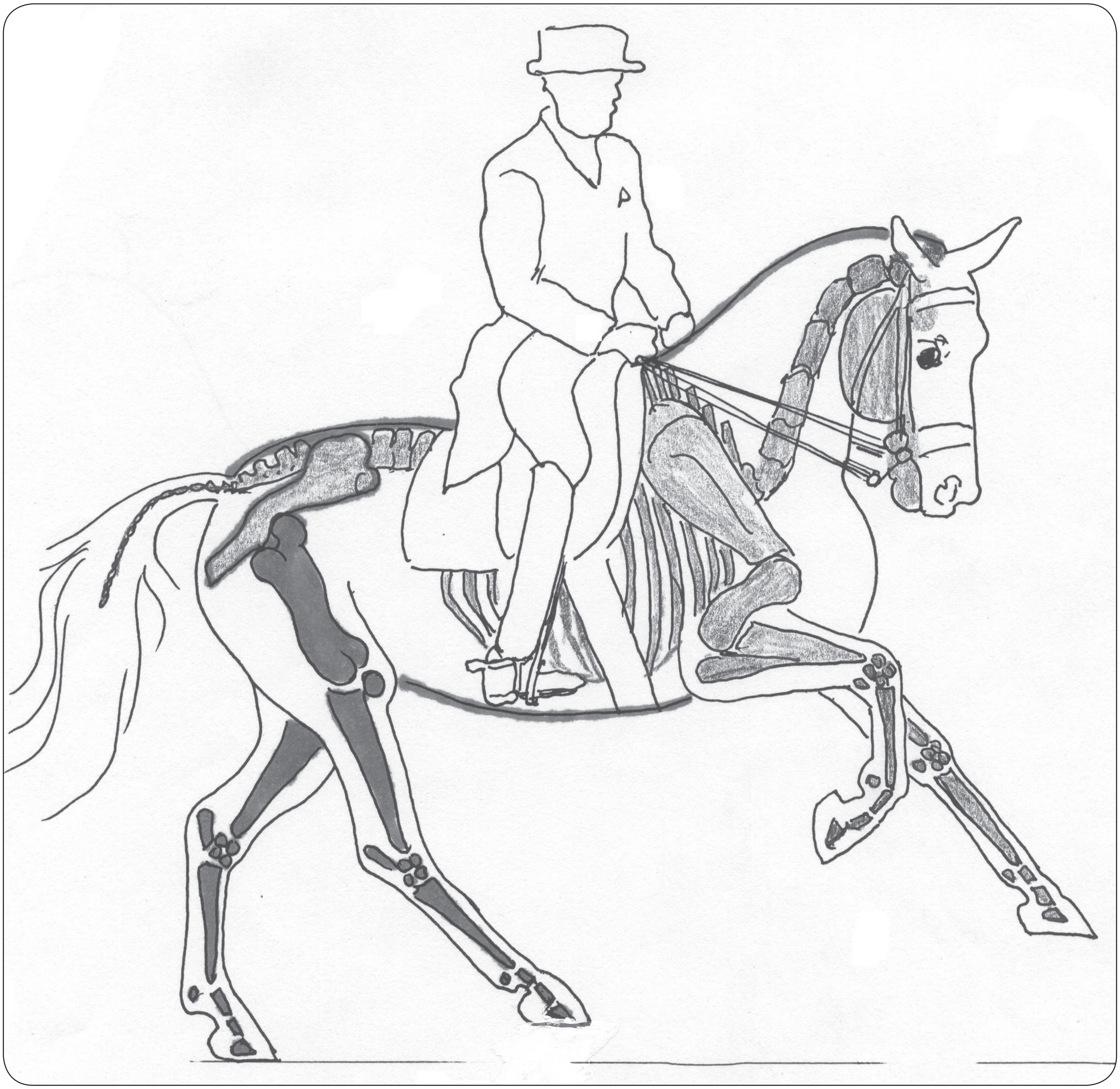
In all of these discussions I am making the assumption that you want to find a way for you and your horse to carry your heads easily, although you might not think of it in these terms. That is a pretty big assumption on my part. However, while you might not think of it as "ease in carrying your head," you probably express these ideals in terms such as riding in: "lightness," "freedom," "harmony," "partnership," etc., with your horse. The ultimate state of freedom in riding is called "self-carriage."

In *Dressage Terms Defined* by Eleanor Russel and Sandra Pearson-Adams, "self-carriage" is defined as "the ability of the horse to accept full weight-bearing responsibility through the hindquarters for himself and the rider. The horse maintains his posture without any support or restriction from the rider." In order to do this, the horse must use his skeleton to support his own weight and that of the rider. Otherwise the muscles will be overloaded with the job of weight-bearing, and the joints would be under tremendous stress. Ultimately this will result in breakdown and injuries, not to mention the mental and emotional stress in both the horse and the rider.

To better understand overloading, think of a tent with aluminum poles trying to hold up 4' of snow. The canvas will tear if it is weak (muscle injuries), the aluminum poles (bones,) are going to fail, the ropes supporting the poles will be pulled out of the ground (tendons and ligaments) under the weight of the snow causing the whole thing to collapse. The poles will give at the joints first, since they are points of weakness, which are unable to bear weight. But on an angled roof with a wood frame and adequate struts, this amount of snow can easily be supported. Therefore, the strength and alignment of the structure (skeleton) is critical to its ability to support the load (the horse's own body weight and that of the rider) in movement.

So let's look more specifically at what needs to happen in order for the horse to be in self–carriage. I am going to break it down into 9 specific points. The order in which each of these occurs will depend on the individual horse and how it is being trained. Also keep in mind that conformation, injury, pain, saddle fit, rider position, temperament, etc., will play a part in whether or not your horse is capable of doing all of these things.

Bear in mind I am talking about the ideal in this discussion. Often reality if far from ideal! However, it is important for you to have some idea of what needs to happen for the horse to be in self-carriage if you are ever going to get there. I am not going to



3. This horse is able to freely swing the hind leg forward through the hip joint. Notice how far under the body the leg has landed. The other hind leg is coiling in order to support the horse and then push off the ground. The horse is lengthening the canter stride. Notice that the back is up and the pelvis is under, allowing the hind leg to swing forward.

discuss how to achieve self-carriage right now. I just want to get you thinking about what is happening underneath your horse's skin for self-carriage to occur.

1. Topline and underline lengthened.

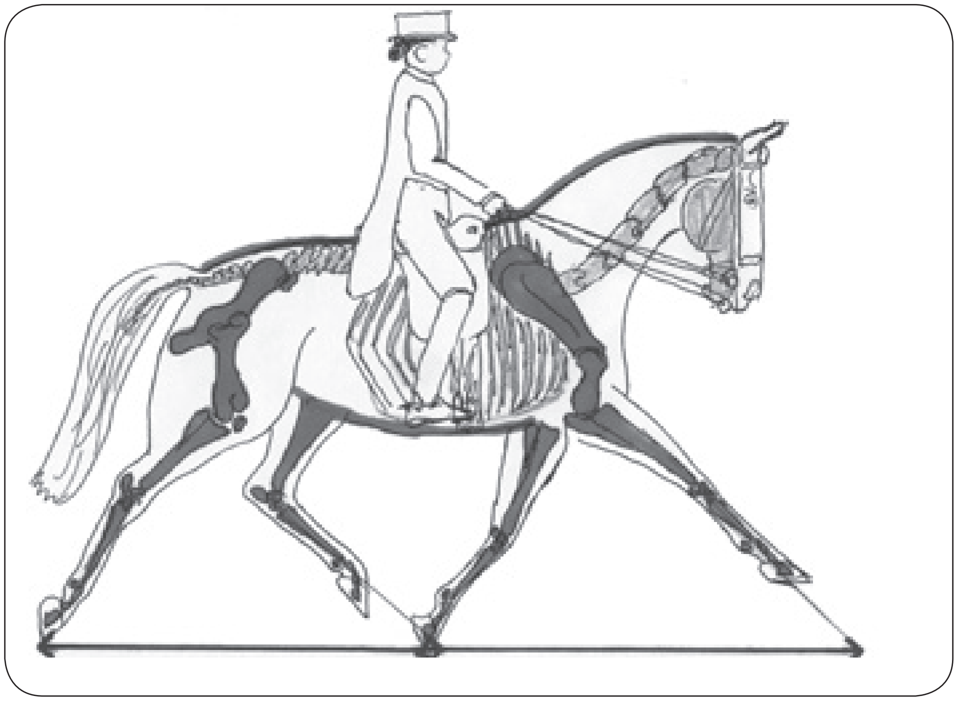
Typically, the topline is referred to as the distance from the poll to the tail. For the purposes of this discussion I am going to limit it to the area from the withers to the croup and the underline from the elbow to the stifle. I will discuss the other areas separately.

We have mentioned this previously in talking about the board of the seesaw. The topline and underline of the horse need to be lengthened. If the topline is contracted (shortened), the back is down rather than up. A back that is down is incapable of bearing very much weight. Therefore, the weight of the rider is going to be transmitted to the horse's front legs rather than the hindquarters. Some of you might remember the example of getting on all fours and having someone press down on each side of your spine at the level of the shoulder blades when you have your back "up" vs. "down." You might recall that when your back was down you were on your forehand and were very uncomfortable in your arms, wrists and hands. If the topline is too round (again remember the seesaw example), it will also be difficult for the horse to lift the front end up.

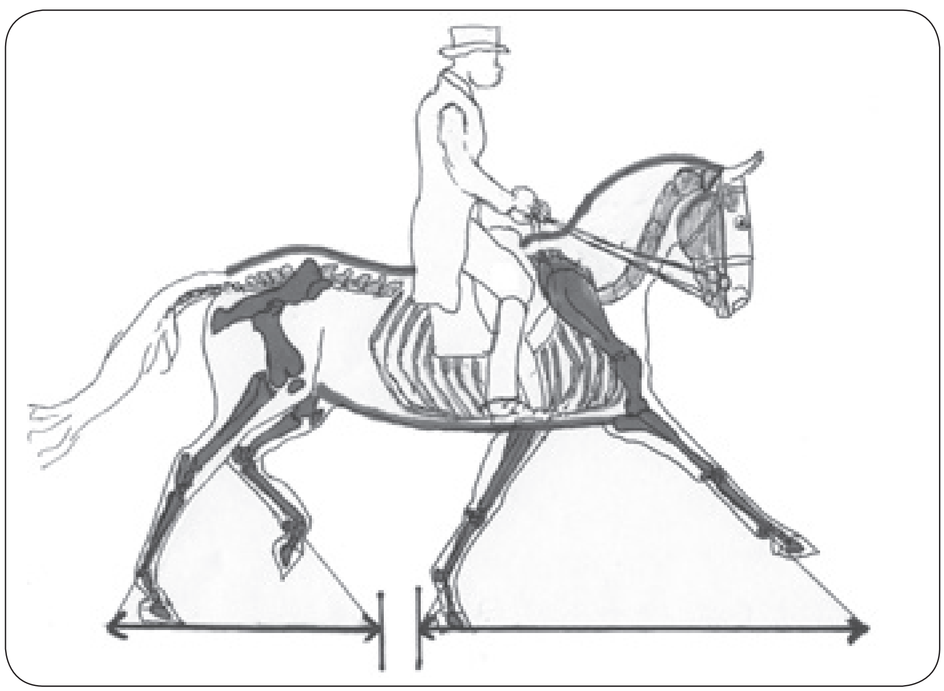
2. Pelvis under. The lumbar region of the horse's back is capable of flexing and extending (remember it has virtually no ability to rotate). Therefore, the position of the horse's lower back will affect his ability to engage his pelvis. Engaging the hindquarters means flexing the lower back and bringing the pelvis under, forward and up. In other words, a pelvic tilt. The lowering of the croup or tilting on the pelvis is extremely important in order to create vertical lift (again remember the seesaw) lightening the front end with the counterbalance of the pelvis (recall the definition of self-carriage is "to accept full weight-bearing responsibility through the hindquarters.") If the horse does not bring his pelvis under, he will have to use extension of the back (arching or hollowing) to lift the shoulders and front end. If the pelvis is tipped up and out, the horse's hind legs will trail out behind. Remember the example of standing up and changing the angle of your pelvis? If you tip your pelvis forward and down, you cannot lift you leg very high. It is impossible to efficiently lift a load with your pelvis out behind you unless you use tremendous upper-body strength.

3.Mobility in the hip joint.

If the hip joint is restricted, the horse will not be able to swing the hind leg very easily. Think of tightening your hip joints and then walking around. How easily can you swing your hind legs forward? All the joints in the hind legs need to move freely. If the pelvis is tipped up and out, the hip joint and the rest of the joints in the



4a. Follow the lines drawn from the hind and front legs that are in the air. You can see where they will meet the ground. The front and back legs form two triangles. The length of the line on the ground for each triangle is the same. Therefore, this horse is tracking up even in the extended trot.



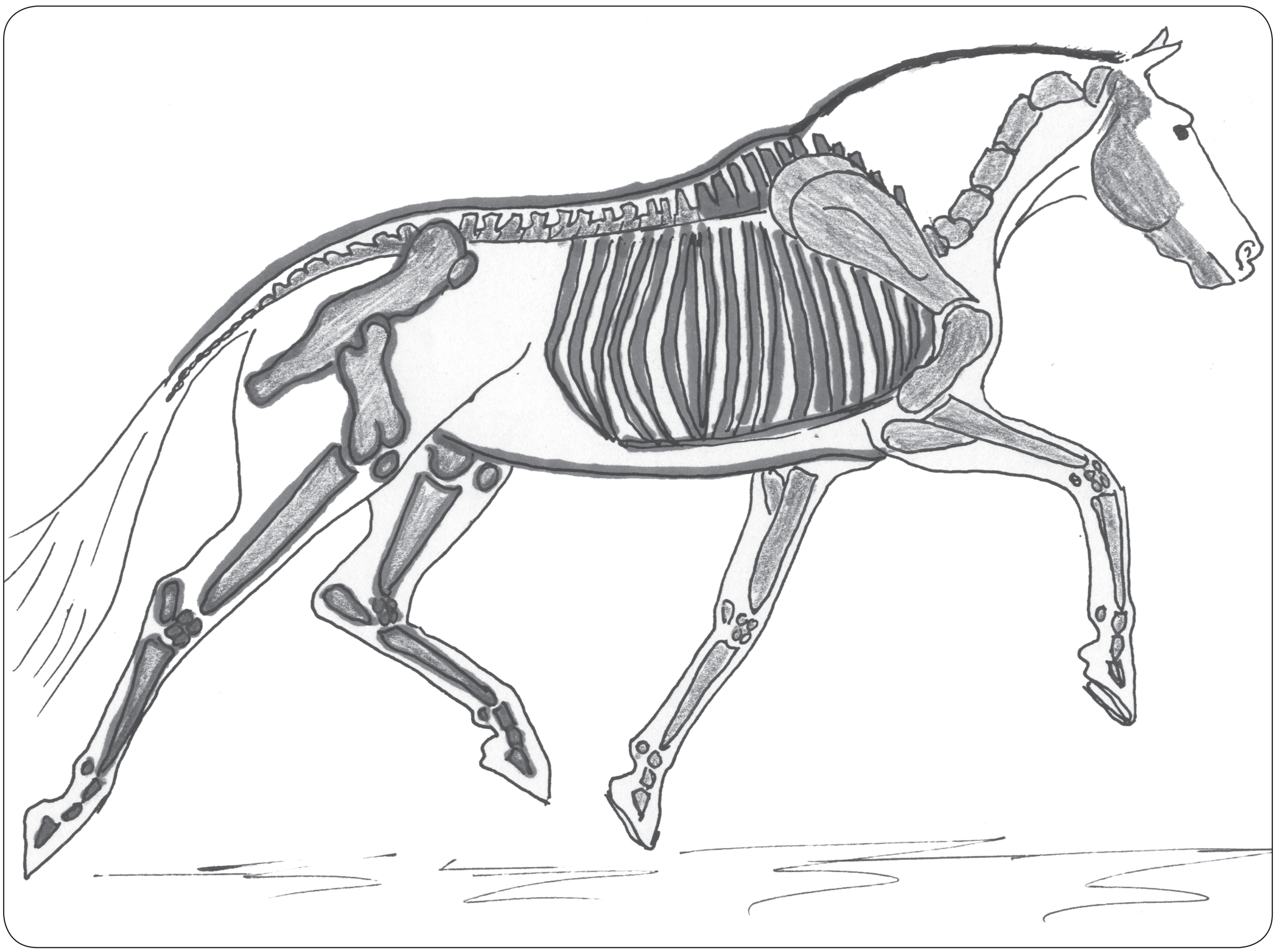
4b. Look at the triangles formed by this horse's legs. The triangle of the hind legs is much smaller than the front legs. There is a gap between where the hind leg will land and where the front leg is. Therefore, this horse is not tracking up. The front triangle is almost 50% longer on the ground line than the back triangle. The horse has shortened, hollowed or extended the back in order to throw the shoulder and front leg forward in an exaggerated manner. Notice also that the pelvis is tipped up and back and the lower back is hollow.

hind leg will be restricted. It will require a much greater amount of effort to get the hind leg under the body. You will have to force the horse through the resistance and make him bring the hind leg further under using very strong aids because the horse is not in a readily available position to bring the hind leg under. Often the sequence of the legs is interrupted and the quality of the gait is severely compromised as a result.

At this point you might already be noticing the interrelatedness of each of these points. Actually it is impossible to separate them because it is the combination that creates the overall function of the skeleton and the horse. However, without some way to isolate individual events, it becomes a difficult concept to discuss. Therefore, I am making these distinctions in order to give you some landmarks. Ultimately all these points must work together. If the horse is stiff in the lower back and has the pelvis tipped up and out, the hind leg will be restricted. If the horse is stiff in the hip joints, he will have difficulty engaging the hindquarters (flexing the pelvis under), etc.

4. Hind leg "tracking up."

"Tracking up" means that the hind foot lands in the print of the forefoot as it leaves the ground. If the horse "over tracks," the hind foot has landed in front of the forefoot print. If the horse is "not tracking up," the hind foot has landed short of the forefoot. The purpose of tracking (also known as engagement of the hind leg) is so that the hind foot lands under the horse's center of gravity. If the hind foot does not track up sufficiently, the push from the hind foot is going to propel the horse's body forward and down rather than forward and up. Instead of



5. This horse has raised the withers. In addition, he has also lengthened through the back, lowered the pelvis and freely flexed the joints of the legs moving forward in flight while extending the legs that have just pushed off the ground. There is tremendous sense that this horse is moving "uphill".

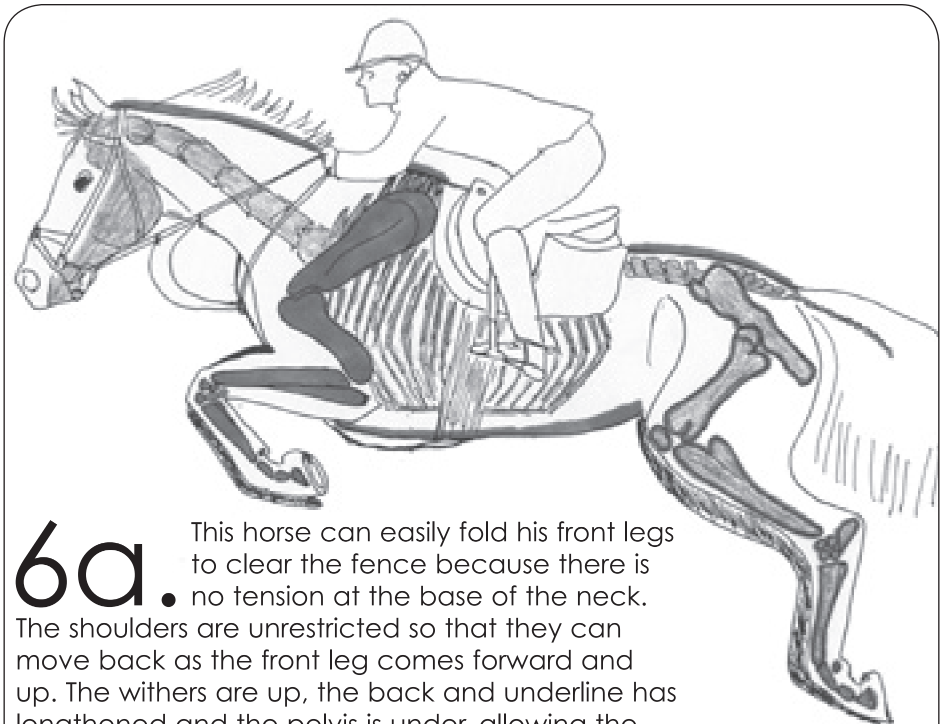
being able to lift the front end, the thrust of the hind foot will send the horse more onto the forehand. The ability to "track up" can be dramatically influenced by conformation. A long-backed horse with short legs (i.e., a draft cross) is going to have a much more difficult time tracking up than a short-backed horse with long legs (i.e., an Arabian).

There are two ways the horse can swing the hind leg under. One way is to pendulum swing the leg much like the way a racehorse moves. The other is by dropping the pelvis and coiling the leg underneath. For lifting power the horse needs to coil the hind leg (fold the joints of the hip, stifle, hock, fetlock). A hind leg that has swung under like a pendulum will not have any lifting power. It will provide more forward thrust.

5. Lift in withers. Perhaps this is the most important part. If the horse is up in the withers, the back can come up. There is room for the pelvis to drop and the hind leg can easily swing under the weight of the rider. Just because the horse's back is up does not mean the horse's withers are up. Many times the horse has dropped the withers down (which also drops the sternum down, since they are connected through the ribs) even when the back is up. However, it is extremely rare to see a horse with the withers up and the back down.

Lifting the withers is critical to what happens in the front end of the horse. If the withers are down, the horse is on his forehand. The weight of the rider will be on the horse's front legs rather than on the hindquarters. The ability to lift up in the withers is greatly affected by saddle fit and rider position. If you find your horse being unwilling to canter slowly, wants to fishtail his hindquarters to slow down or tosses his head in the canter transitions, it may be a result of his inability to lift up through the withers.

6. Release of tension at the base of the neck. As the withers come up, the horse no longer braces through the sternum. The base of the neck



6a. This horse can easily fold his front legs to clear the fence because there is no tension at the base of the neck. The shoulders are unrestricted so that they can move back as the front leg comes forward and up. The withers are up, the back and underline has lengthened and the pelvis is under, allowing the horse to clear the fence with a minimum of effort.

6b. The weight is coming down into this horse's shoulder and front end. Notice that the line from the croup to the withers is downhill in front. While the angle of the pelvis is under (this horse is really goose rumped), the hind legs are not tracking up, so the weight is going forward and down through the sternum.

7. Lengthening the neck is not limited to one discipline or type of horse. It is a question of function, not style or breed. If the other elements are there, the neck can lengthen from the base at the shoulder to the poll. This horse has all the elements, which allow his neck to lengthen. Notice that the jaw is soft and the poll is the highest point.

8. This horse has been "broken" in the neck. The third cervical vertebra is the highest point instead of the poll. Notice also that the front legs are braced backwards at the knees and the weight is still on the horse's forehand. The jaw is jammed against the throat.

stops working so hard and these muscles decontract. Once this happens, the horse will be able to raise the forelegs through the shoulders rather than primarily from the knee. The movement of the front legs will become more elevated and elegant.

7. Telescoping neck. As the withers lift, the neck is able to lengthen or extend from the base to the poll in a telescoping movement. If the withers are down, the neck will shorten rather than lengthen. Often the neck appears to "grow" out of the withers and shoulders rather than appear pulled down to the withers when the neck lengthens. Look just in front of the withers; if there is a dip there, the neck probably shortened. If this area is full, the neck is lengthening when the horse is working.

8. Soft jaw. The muscles of the tongue are connected to a small bone called the hyoid bone. This small bone floats inside the horse's jaw area and is not connected to the horse other than through muscles. The muscles of the tongue attach to the hyoid bone as well as a number of other muscles including one that runs from the hyoid bone to the sternum. When the sternum is down (withers down), the under-neck muscles tighten and restrict the tongue via the hyoid bone. This often causes tension in the jaw. As the withers lift and the neck extends, it is common to see the horse's tongue come forward and rest on the back of the lower incisors. If the jaw is tense, the tongue is often busy and/or drawn back and the horse wants to open his mouth.

9. Poll the highest point. The poll (the atlanto-occipital joint) is the joint between the top of the spine and the horse's skull. When a horse is moving correctly, this point is the highest point in the arc of the neck regardless of the frame (shape of the outline of the horse). No matter whether the horse is on a long rein or ridden in a high degree of collection, the poll should be the highest point in the arc. Often the highest point is not the poll but rather the joint between the second and third cervical (neck) vertebrae. The horse is not in self-carriage if this is the case.

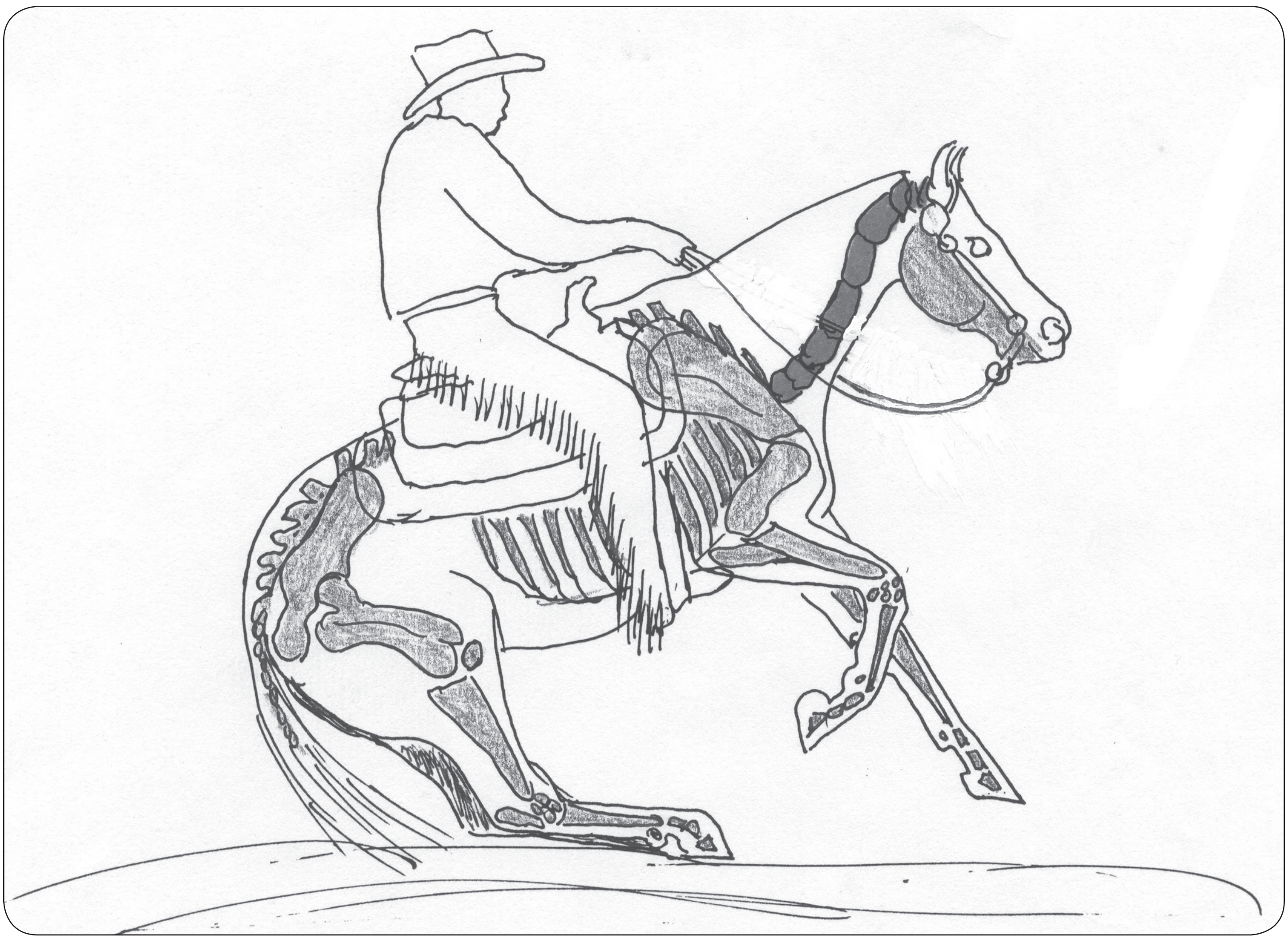
Is my horse carrying himself?

A quick way to check if the horse is carrying himself is to look for the poll as the highest point (the end of the arc), and whether there is a dip in front of and/or behind the saddle. This will give you a good indication of the overall picture. If there is a dip in front of and behind the saddle, the horse is most likely shortening its back rather than lengthening its back.

You can start looking for other details that confirm if the horse is in self-carriage, carrying his weight and that of the rider through the hindquarters or not. Another way to check if the horse is in self-carriage is to watch the poll. When the horse is moving, if the poll is pulsing forward and down (again this is regardless of the degree of collection or frame), the horse is lengthening through the back and is most likely correct. If the poll is pulsing back and up, the horse is shortening through the neck and back. The horse can be in self-carriage only if he is lengthening through the back and neck.

Hopefully this gives you a clearer picture of what the horse has to do to be in self-carriage. After you go through the drawings and captions once, go back again. Look at each for all 9 points in each drawing. Compare the images with and look for the overall patterns. Then grab a magazine and examine the photos. Begin to educate your own eye. Are the horses in the pictures in self-carriage?

In the next issue we will look at what the rider has to do. Perhaps you will have already figured it out before we get there!



9. Even in this slide stop the poll is the highest point. The horse's jaw is soft; notice that the mouth is closed and there is no pressure on the reins.

Rider Self-Carriage

In the last article, I discussed what the horse has to do in order to achieve "self-carriage — the ability of the horse to accept full weight-bearing responsibility through the hindquarters for himself and the rider." I divided it into 9 attributes.

In this article I am going to discuss what the rider has to do to be in self-carriage; i.e., accept full weight-bearing responsibility through the hindquarters for himself. This allows the rider's "front end" or shoulders and arms to move freely, thereby achieving one of the most desired goals – soft hands. In case you haven't already guessed – self-carriage for the rider is essentially the same thing as for the horse!

Remember that both the horse and rider have a skeleton, muscles, bones and joints. We both are subject to the laws of gravity. Therefore, we function in a similar way. Keep in mind that there are some significant differences between horses and humans. Horses are horizontal, while we are vertical and horses don't have a collarbone. In general, the similarities far outweigh the differences when defining what constitutes self-carriage.

By now you might be wondering why I keep going on about how the man and horse are so comparable. The reason is so that you can understand how your position, movement, awareness of yourself in space and in relation to the horse directly influence that horse whether you like it or not.

Sometimes I find the correlations so subtle and profound that it surprises me. A quarter-turn of the wrist or lengthening on one side of the back and the horse completely changes his way of going. Therefore, if the rider conducts themselves in such a way that they are not leaning on the horse for support, it will open the way for the horse to arrive at self-carriage.

1. Top line and underline lengthened.

First, let me say that you cannot get rid of the naturally existing curves in your spine. In a normal spine you have a forward curve (lordosis) in the cervical and in the lumbar region. These curves add supporting strength to the spine. A side-to-side curve is called a scoliosis. Many people have a slight scoliosis, which does not cause any trouble. A severe scoliosis can be a serious health problem. The thoracic area between the shoulders is slightly rounded. A rounding of the spine is called a kyphosis.

Often people sit or stand in a way that exaggerates the curves in their spine. Social pressure, injury, poorly designed chairs or unconscious modeling of parents and friends can cause this posture. Other people are born with spines that are too curved or too straight. These are congenital issues rather than a function of the way one uses oneself.

When sitting, the shape of the spine changes from a standing posture; the lumbar curve decreases slightly. When sitting correctly on a horse, the back can have the appearance of being straight. However, the spine still maintains its natural curves in order to provide the structural strength to support the body. It is the muscles that give the back its flat appearance.

The muscles of the back and abdomen can be shortened or lengthened depending on how they are used. Shortening either the underline (or front of the body) or the topline (the back) will cause a curving of the spine. Remember it is the muscles that move the bones. When the back is shortened, the person is hollowing or arching her back. When the underline is shortened, she is rounding her back. In the arched or rounded position either the topline or underline is shortened. When both the topline and underline are lengthened, the rider is upright with the normal curves through the spine.

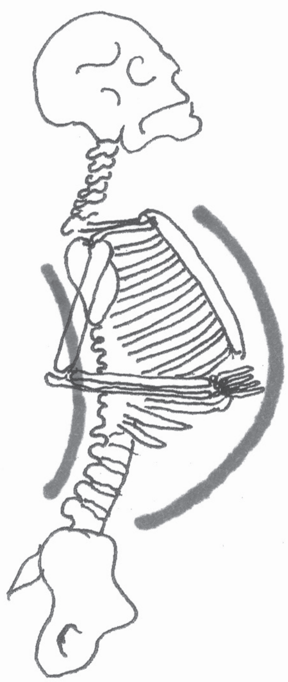
2. Pelvis under.

The rider's pelvis provides the base for the spine and head (remember the bowling ball, flexible straw over a bowl analogy from, page 9). If the seat bones are tipped forward or back, there is little skeletal support for the head and torso. In order for gravity to go through the skeleton, the seat bones need to be in contact with the saddle when the rider is sitting in the saddle. The rider's pelvis mirrors the pelvis of the horse. When the horse's pelvis is more engaged (i.e., a sliding stop), the rider will also have their pelvis tipped more underneath. However, excessive shoving and pushing in a "driving" pelvic position does not necessarily create a more engaged horse.

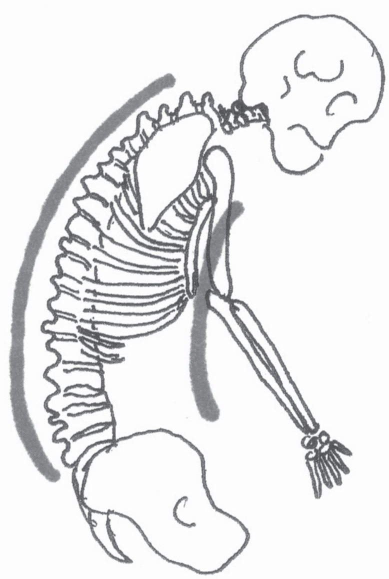
If you are shoving your seat into your horse's back, you are no longer lengthening through your underline. If held too long or too hard, then the rider is no longer in self-carriage. Gravity will be pushing your head downward and the spine is no longer in a position to support it efficiently. As a result, there is a downward force on the horse's back. This downward force often

1a. Topline and underline lengthened.

1b. When riding on the flat, the upper arm hangs vertically down from the shoulder with ribs visible in front of and behind the arm. The seat bones are directly under the spine and the leg is flexed with the foot underneath the line of the spine. This forms the Classical alignment of ear, shoulder, hip and ankle.



1c. Topline shorter than underline. The back muscles are contracted and the back is arched. This would be the equivalent of a hollow-backed horse on the forehand. Notice that the arms are pulled behind the rib cage; the head is tilted back, and the pelvis is tilted forward and down.



1d. Topline longer than underline. The chest is caved inward, shortening the underline. The topline (back) is overly stretched. The head is forward and down with the pelvis tipped too far under. The upper arm is in front of the rib cage.

causes the horse to hollow his back. Once the horse hollows his back he is no longer in self-carriage. The hindquarters are removed from the weight-bearing responsibility. In a sliding stop the horse maintains the high degree of engagement into a stop. He does not continue pushing with the hind legs again until the stop is completed. Therefore, the position of the rider's pelvis is maintained until the end of the stop.

When horse and rider are in self-carriage, the pelvis is in position to take weight-bearing responsibility of the rider's torso and head. If the back is hollow, the pelvis is no longer capable of taking this responsibility for the weight of the rider. Instead, the hip joints tighten, the legs grip and the back arches to support the weight of the rider. In effect, the rider has "disengaged" her pelvis, which will cause the horse to do the same thing. Horse and rider will need the support of the reins rather than bear weight through their respective hindquarters.

3. and 4. Mobility in the hip joints, hind legs tracking up.

I have combined these two points for the rider. While the rider does not actually "track up" (hind foot step into the print of the forefoot), the concept remains the same. When the horse "tracks up," he needs to have enough mobility in the joints of the hip, stifle, hock, fetlock and hoof to step freely forward. The rider's joints need to be supple in order to move in the comparable joints of the hip, knee, ankle, and foot. If the rider is restricted in these joints, she will be unable to bear weight through the hindquarters. Instead, the stiffness will travel up through the skeleton, causing the rider to bounce upward against the horse's movement rather than sink down into the horse.

Many riders are stiff in the ankles. In order to avoid moving this joint (or series of joints to be more exact), they lengthen the stirrups or get stirrups that have a hinge in the sides. However, this avoids the problem rather than resolves it. While it may not be possible to get all of your range of motion back in your ankles, I strongly suggest you begin a gentle program of increasing ankle flexibility instead of resorting to "fixes." The ankle is the equivalent of the horse's hock—an extremely important joint for your horse. I have found that when someone is stiff in their ankles, they are also stiff in the hips. This will inhibit the rider's ability to sit into the horse.

While you may think that your ankles are never going to regain their flexibility because you have broken or sprained them several times, I do believe that you can make improvements. I have one student that broke both ankles a total of 9 times. When I first began to work with him, I wondered if we were ever going to regain any movement in his ankles, particularly the right one. He was unable to post correctly, sit the trot or canter as a result because he would push off the stirrup instead of letting his ankle sink. He had avoided the problem by riding bareback for years. I would see him for a clinic once or twice a year for about 4 years. This last time I was totally amazed. When I put my hands on his right ankle, it had a tremendous range of movement (a far cry from the cement block we first started with). As a result he is now able to sit the trot and canter allowing his heels to sink down rather than push off the toes. After seeing this kind of change, I am convinced that anyone can improve ankle flexibility!

Flexibility in the hip, knee, ankle and foot is critical to weight bearing through the hindquarters. These joints allow the rider to absorb the motion of the horse and stay close to the horse's back regardless of the discipline.

5. Lift in the withers.

The "withers" in the rider are between the tops of the shoulder blades. The withers are the spinal processes of the upper thoracic vertebrae. The thoracic vertebrae have ribs, which connect to the sternum. Therefore, another way to say lift in the withers for the rider could be lift the chest. This is different from sticking your chest out, which would be the equivalent of a horse that has dropped his withers. Conversely, overrounding the upper back would be similar to a horse with an overly rounded back that cannot lift his shoulders. There is a fine line between overarching or overrounding the upper back. In the middle is lift in the withers. This creates depth through the chest area.

6. Release of tension at the base of the neck.

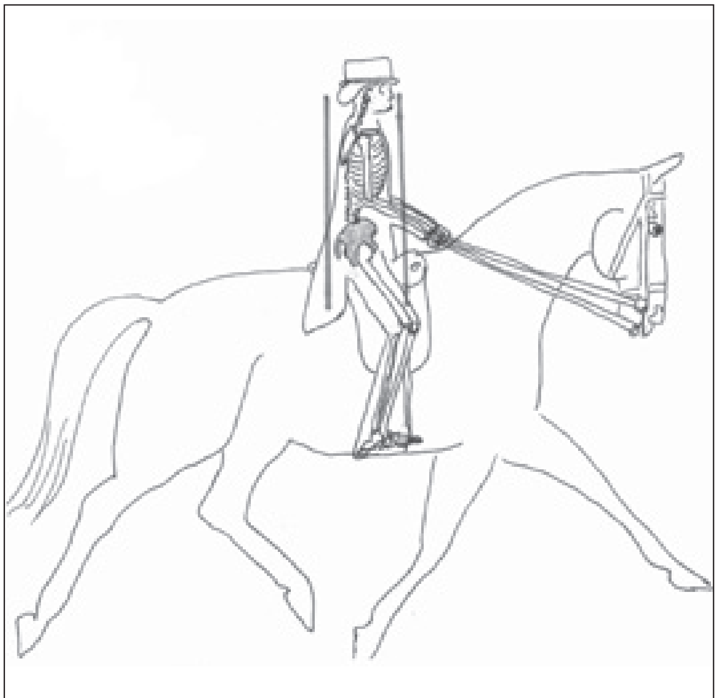
The shoulder girdle sits on top of the rib cage. If the rider's shoulders are overly pulled back or rounded, there will be an increase of tension at the base of the neck. As the withers lift and the chest expands, the shoulders can "sit" on top of the ribs, releasing tension at the base of the neck. If the shoulder blades are pulled back in order to "sit up straight," there is an increase of tension at the base of the neck and the arms become restricted. If the shoulders are in front of the rib cage, the distance between the collarbones narrows, also causing tension at the base of the neck.

7. Telescoping neck.

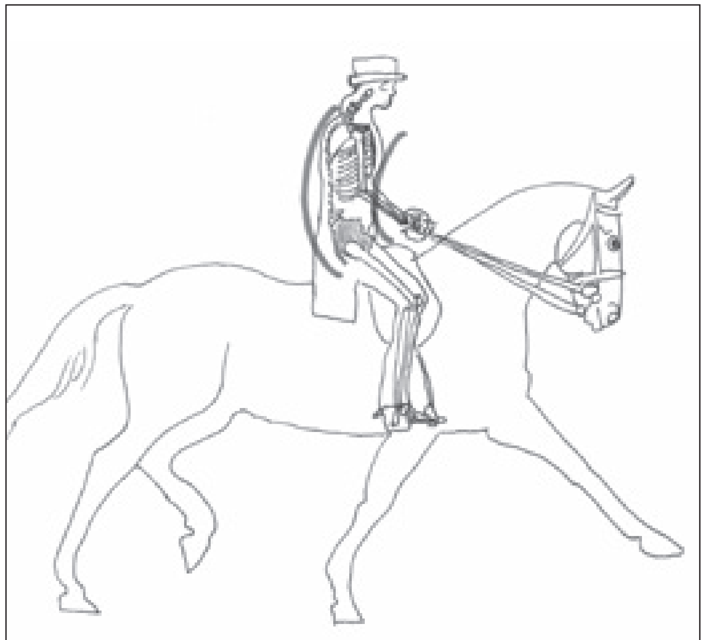
The rider's neck needs to lengthen just as the horse's neck must lengthen from base to poll. If the neck is shortened it will limit the mobility of the head, neck and shoulders. Pushing down or "driving" with the seat often causes the rider to shorten and tighten in the neck. Therefore the ability to telescope or lengthen the neck is indicative of whether or not the rider can lengthen the entire spine.

8. Soft jaw.

Tension in the jaw will create tension in the entire body.



2a. Rider with seat bones under her in the extended trot. Her topline and underline are long. She is over her feet, and her upper arms are in line with her torso. The horse is also lengthened in both the topline and underline with excellent length of stride, especially with the hind leg.



2b. The rider's pelvis is tipped too far under, trying to drive with his seat. His head and legs are in front of the vertical line and he is gripping with his hips and knees. His arms are tense because he is pinching himself out of the saddle. Notice that the horse's back and withers are down and the hind legs are not tracking up. This horse is not in self-carriage.

2c. This rider is in a hollow-backed position. The topline is longer than the underline. Notice that the upper arm is pulled back, the elbow is behind the rib cage. There is tension in the base of the neck, shoulders, and jaw. The horse is mirroring the rider's hollow-backed position, jammed jaw, tipped pelvis and stiff hips.

2d. Sliding stop. Horse and rider are mirroring strong pelvic engagement. Notice that the rider remained soft in the hip, knee and ankle.

There is a tremendous amount of muscle strength in the jaw. When these muscles strongly contract, they affect many other parts of our body. Think about the last time you saw someone "set their jaw" when getting into an argument with their horse or another person. There is a combative element to the set of the jaw. Just tense your jaw while you are sitting there and imagine holding the reins. Feel how your hands are affected by the tension in your jaw. The muscles of the tongue, and throat are directly affected; therefore, a soft jaw allows greater freedom of movement throughout.

9. Poll the highest point.

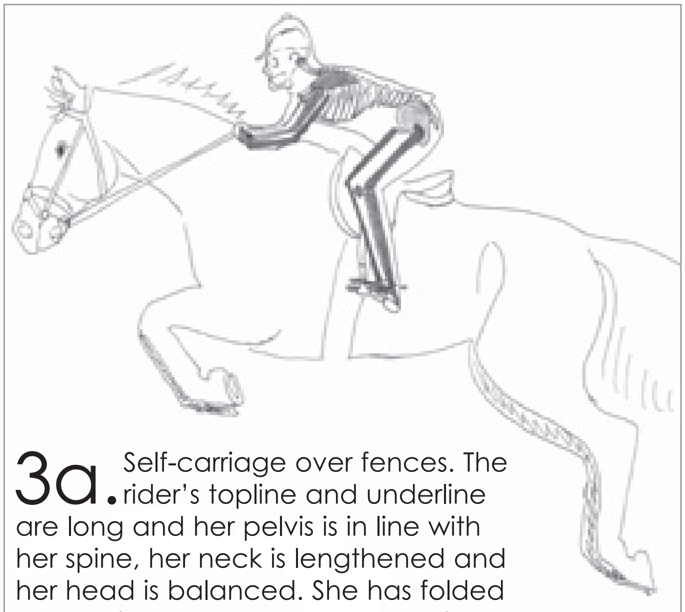
The horse's poll is between his ears. This is pretty obvious and you can feel the bump of the poll at the top of the forelock. Our poll is much less obvious. Our poll would also be where the top of the spine meets the skull. This is between our ears. If you were to draw a line straight back from the end of your nose and between your ears you would find your poll. So it is not entirely accurate to say poll is the highest point because our skull lies above our poll.

The point here is that the head needs to be balanced on the top of the spine. It might be more accurate to say the top of your head is the highest point. If the head is tilted forward or back, then the top of your head is not the highest point. If the chin is tucked too far down, the top of the head will be pointing forward. If the head is tilted too far back, the top of the head is pointing backward.

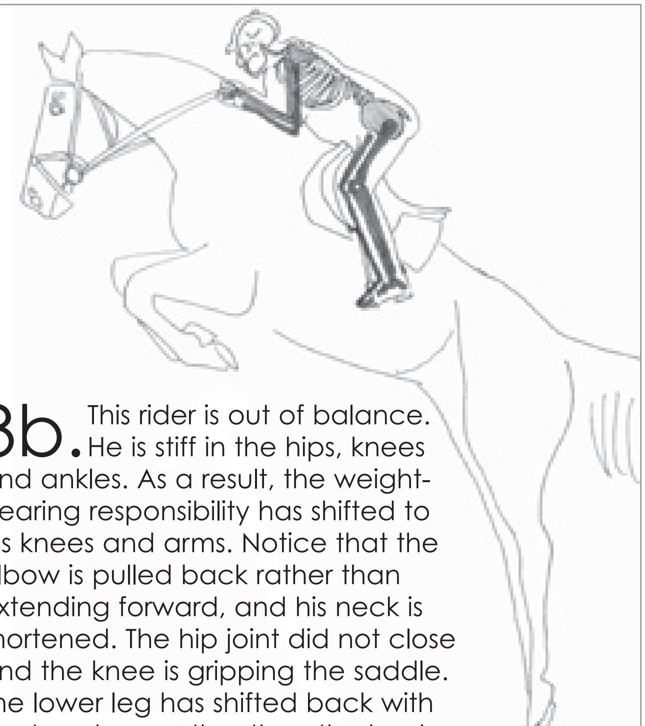
In a nutshell, the horse and the rider need to do the same thing in order to be in self-carriage. If the horse or the rider is not in self-carriage, it will influence the other party. Horses and riders will almost always mirror each other. If the horse is stiff in his hips, the rider will often be stiff in her hips. If the rider is tight in the shoulders, the horse will be tight in the shoulders. I find it incredible that there is such a high degree of correlation between the two bodies.

Perhaps my best example of how powerful this mirroring between horse and rider is was demonstrated by a student I had a few years ago. She came for a lesson, but her horse was lame in the right front leg. I offered her my horse, Andy, who was perfectly sound the day before. When this woman got on Andy he was obviously lame in the right front leg! It did not take me long to realize that it was the woman who was causing the lameness. Within a few minutes we figured out what she was doing and suddenly Andy was sound again.

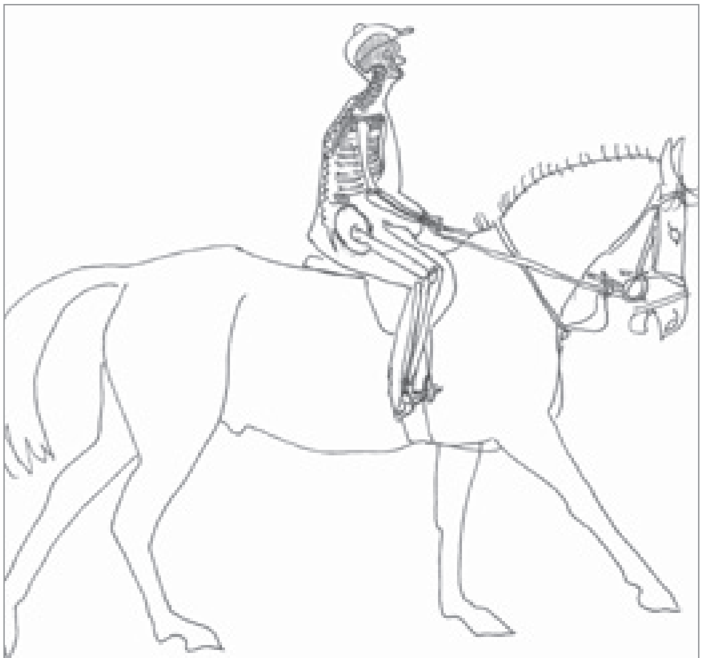
The stiffness or flow goes both ways. The more we become aware of this exchange, the deeper the correlation can go. Whether you are a pleasure rider or an upper-level competitor, the magnitude of this correlation is no different. It is simply the degree of subtlety that differs. Granted, there are some things we will not be able to change due to our or our horse's physical limitations. This does not limit the exploration and differentiation we can achieve around these "limitations." We can look at these "limitations" as challenges we need to learn more about. However, there are some things that will limit the ability to be in self-carriage. One major factor is the saddle. In my next installment I am going to discuss how the saddle can influence the horse and rider's ability to be in self-carriage.



3a. Self-carriage over fences. The rider's topline and underline are long and her pelvis is in line with her spine, her neck is lengthened and her head is balanced. She has folded at the hip, knee and ankle. Her hindquarters are accepting the weight-bearing responsibility; therefore, her weight is over the horse's center of gravity. This has allowed her arms to extend easily, following the horse's mouth with her hands.

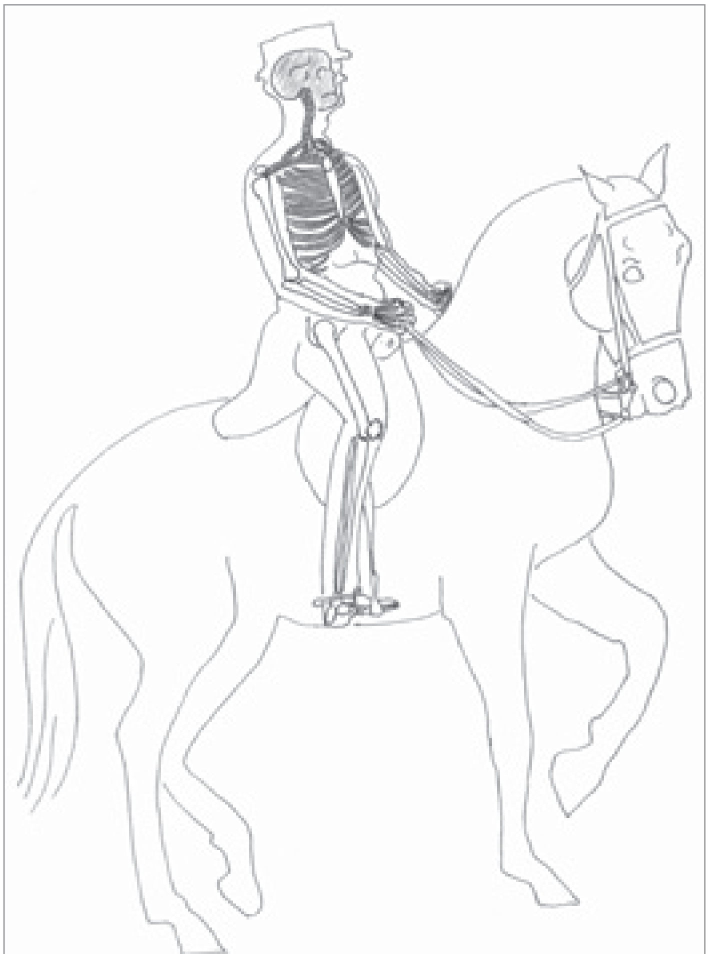


3b. This rider is out of balance. He is stiff in the hips, knees and ankles. As a result, the weight-bearing responsibility has shifted to his knees and arms. Notice that the elbow is pulled back rather than extending forward, and his neck is shortened. The hip joint did not close and the knee is gripping the saddle. The lower leg has shifted back with the toe down rather than the heel. The rider's body weight is over the horse's shoulders rather than the horse's center of gravity.



4a. The rider's withers are down, There is tension at the base of the neck and the top of the head is tilted back. As a result, the rider is pulling on the horse's mouth.

4b. This rider has a tremendous amount of tension at the base of the neck and in the jaw, upper back, shoulders and arms. His head is tilted back. Notice that his arms are behind his rib cage.



4c. Horse and rider in self-carriage. Her collarbones are wide and open. There is no tension at the base of the neck. The neck is long and the top of the head is the highest point as a result of her deep soft seat. Her arms are by her sides with a sense of lengthening to the horse's mouth. Her hands softly hold the reins.

What the Saddle Does

In the previous two articles, I have alluded to the fact that the saddle will have an effect on both the horse and the rider in our search for self-carriage. In this installment, I am going to go into more detail.

The saddle is an inanimate interface between two living beings. In order for the horse and rider to achieve self-carriage, the saddle needs to fit them both. The saddle's purpose is to:

• Distribute the rider's weight over as much of the horse's weight-bearing surface area as possible.

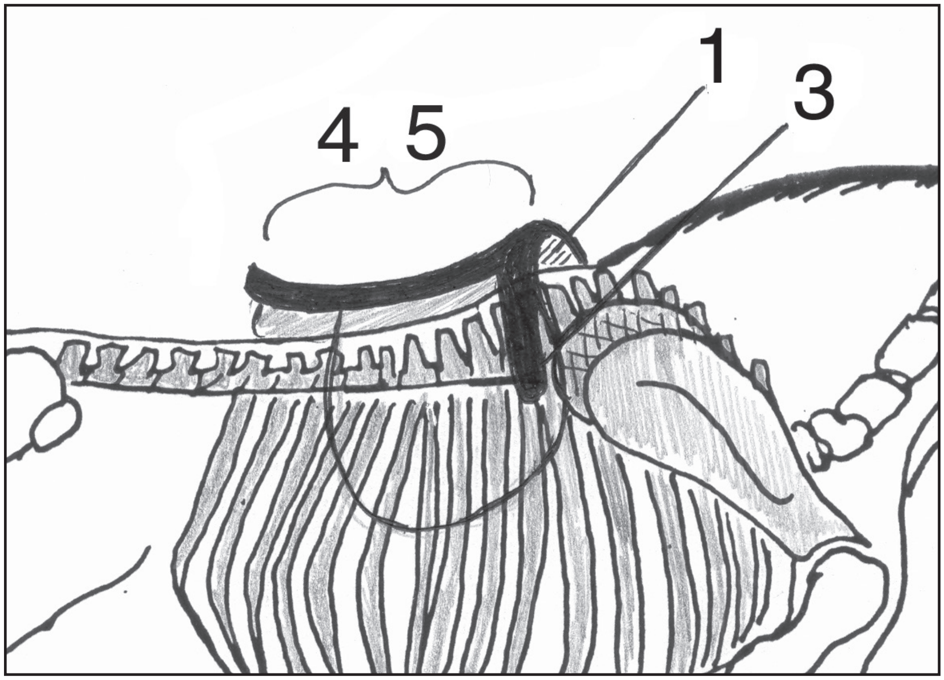
• Fit the shape of the rider to provide comfort and ease of movement.

• Transmit the rider's aids to the horse clearly and efficiently.

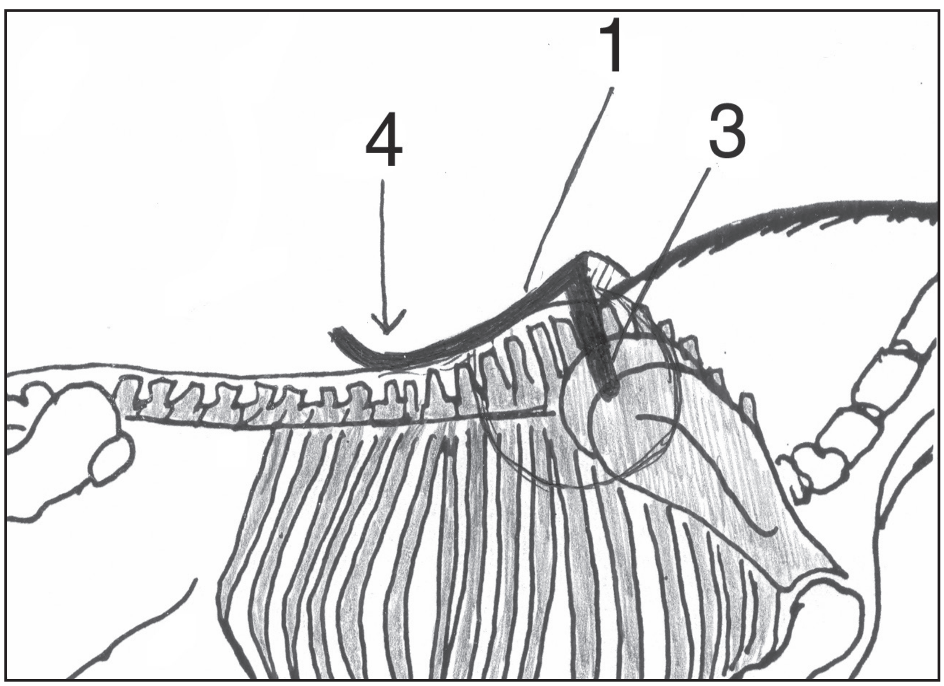
• Be sturdy enough to serve its purpose without harm to the horse.

Poor saddle fit will cause the horse and rider to alter the way they move in order to compensate for any discomfort. Depending on how poor the fit, there can be adverse mental, emotional and physical effects for both.

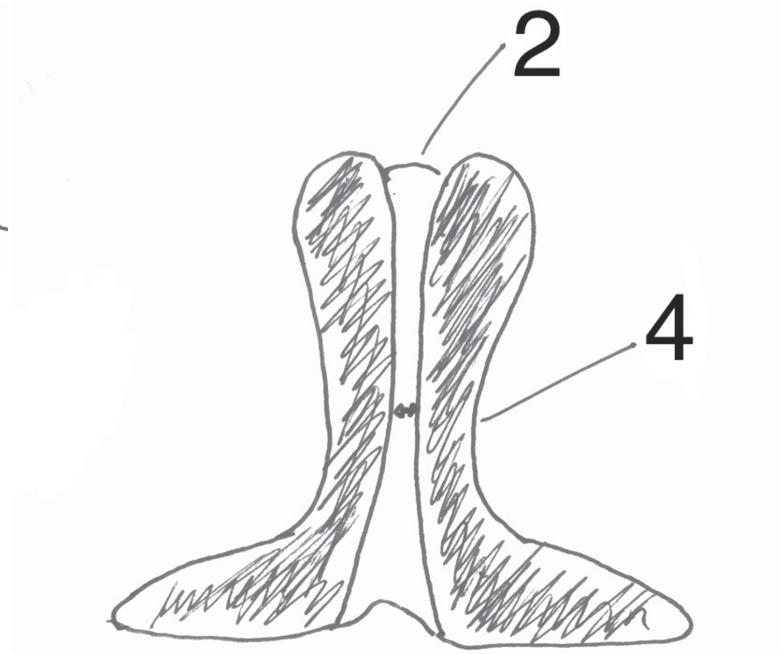
Poor saddle fit is like hiking in a pair of shoes that do not fit. You feel all the pressure points, wrinkles in your socks and every rock and tree root underfoot. You can't wait to take those shoes off! The degree to which the saddle causes problems can vary. Regardless of degree, if you are concerned about the pain in your back, it is really difficult to be in a receptive



A good fit. The saddle:
1. Clears the spine.
3. Clears the shoulder.
4. Distributes the weight on the long back muscles.
5. Matches the contour of the horse's back.



A poor fit. The saddle:
1. Hits the back of the horse's withers.
3. Sits on the horse's shoulder.
4. Does not distribute the weight evenly over the long back muscles.



An English saddle that is too narrow in the gullet with very round panels. This saddle:
2. Does not clear the spine.
4. Places all the pressure on a very narrow line along the bottom of the panel.

mode to learn and follow directions.

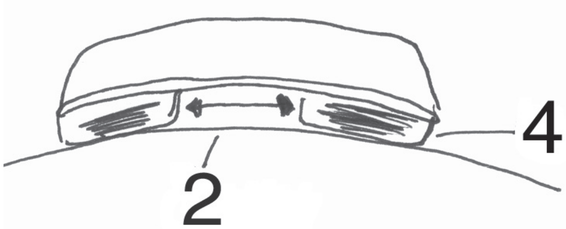
Bottom line, the saddle needs to fit both the horse and the rider for the equation to work. Therefore, when people ask me what is the best saddle for their horse, I tell them "one that fits." I could care less what brand the saddle is, how much silver is on it, what it cost, or if it is the latest style. If it doesn't fit, you're going to have problems sooner or later. That said, finding a saddle that fits is a whole other story.

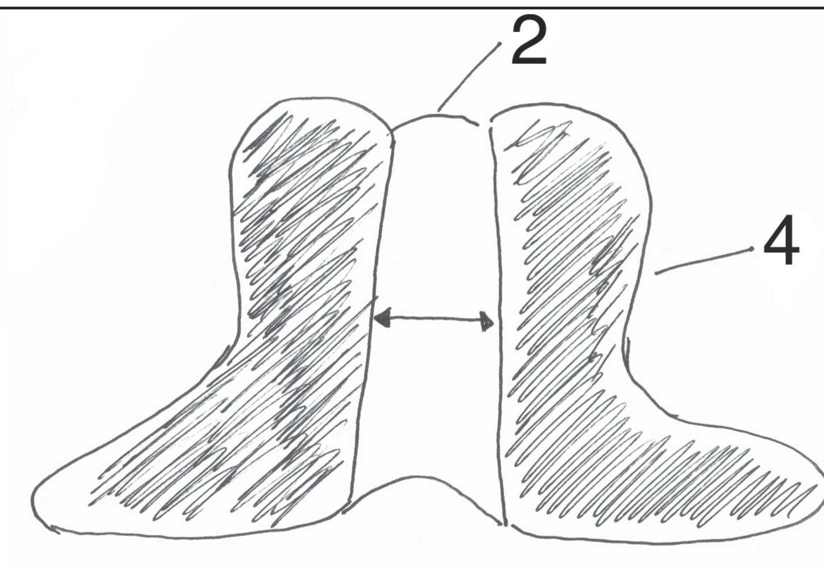
In this article I will give you an overview of what the saddle has to do to fit the horse and the rider. However, there is something you need to remember—there is no perfect fit. Finding a saddle that fits reasonably well can be difficult. Quality control is severely lacking in the industry. I have often checked two new saddles of the same make and model only to find them poorly constructed and extremely different in shape and fit.

I am not going to solve all your saddle fitting issues in this article. Most likely I am going to make you aware of some unnoticed problems you have had all along. I am sorry about that. Often, by the time I get done talking about saddle fit at a clinic, most people simply want to ride bareback. That is not a solution. There are many activities where you want and need a saddle, so riding bareback only avoids the problem.

Most people have spent a lot of money on a saddle they thought was the right saddle. They get pretty upset when they find out there's a problem. Please don't cry. It streaks the pages in the magazine. Instead, start making a plan toward figuring out what you need.

Finally, there are no quick fixes. It takes education and time to make a wise choice. You have to weigh the odds to find something that is going to fit. What you are hoping for is a workable match. Take your time. Educate yourself, look, listen and learn about saddles. In the end you will save yourself time and money.





This English saddle is wide in the gullet with broad panels; therefore, it:
2. Clears the spine.
4. Distributes the weight over the long back muscles.

What the saddle has to do to fit the horse

There are six basic things the saddle needs to do to fit the horse:

1. Clear the withers

The saddle needs to clear the withers 100% of the time. The withers are like your shins in that there is little to no protective flesh over the bone. If I were to tap on your shin repeatedly even a few times, you would try do something about it. The horse can't do anything except try to avoid the discomfort, which is often perceived as being resistant. It doesn't matter by how much you clear the withers. What matters is that they are always clear.

The weight of the rider can change wither clearance. When checking your saddle, make sure it is girthed up as usual and you are mounted. Have someone place their hand between the saddle and the withers. Is the saddle sitting on the withers? If the rider stands up in the stirrups, does it increase the pressure on the person's hand? Be careful, this could hurt. On long, high-withered horses there may be clearance at the front (where you can see), but the gullet of the saddle may be sitting on the withers farther back.

2. Clear the spine

The saddle needs to clear the spine 100% of the time. If there is pressure on the spine, the function of the horse's back will be impaired. A saddle putting pressure on the horse's spine is like someone jamming his finger into your back. The horse will drop his back away from the pressure. There is also the potential for pressure on the spine if the gullet of the saddle is too narrow. This becomes obvious when the horse does circles and turns. He will often raise his head, change rhythm or alter his gait at the corner when the saddle presses on his spine.

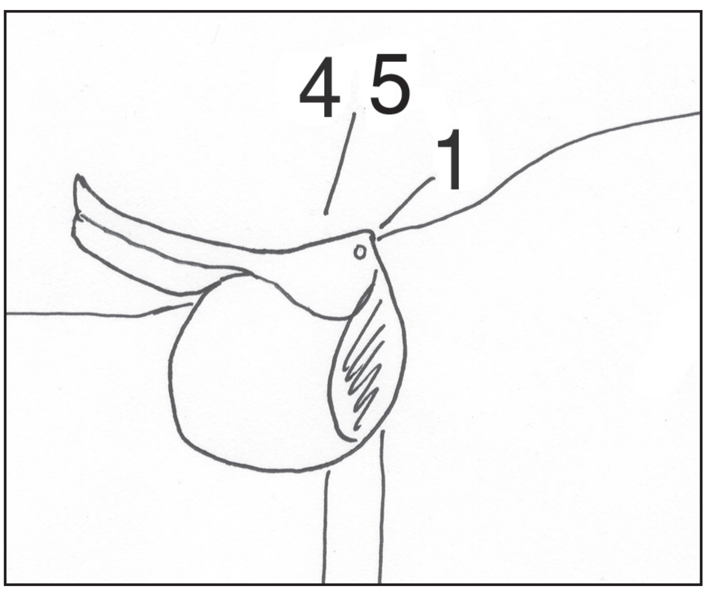
To check the gullet width, turn the saddle over and see if you can measure three to four fingers width throughout the length of the gullet. You can also visually inspect for straightness while you are there.

3. Clear the shoulders

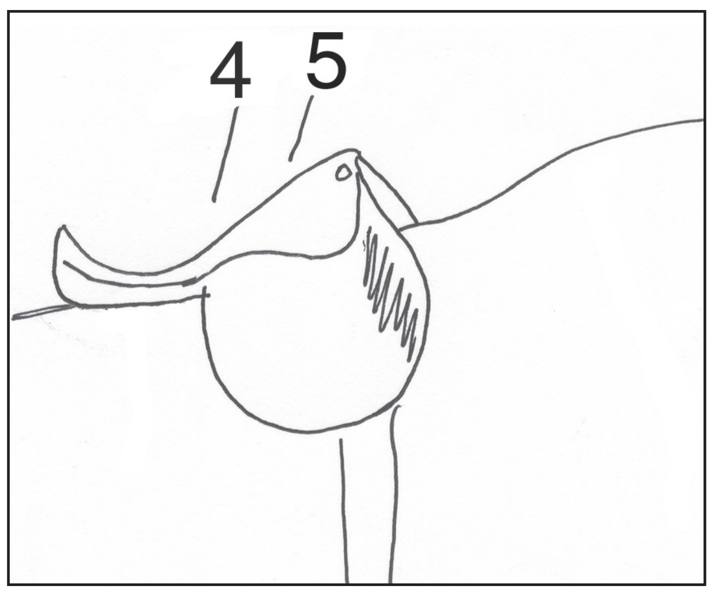
The horse's shoulders comprise the shoulder blade, a cartilage cap that is on top of the shoulder blade and muscling over the shoulder blade. The shoulder must be able to move freely for the horse to have fluid gaits.

The horse's movement could be impaired if there is too much pressure on the horse's shoulders. Pinched shoulders may also inhibit the horse's ability to lift the withers. Some Western saddles are actually designed to sit on the horse's shoulders and will not be balanced if they are placed in the correct position on the horse's back. These saddles should be avoided.

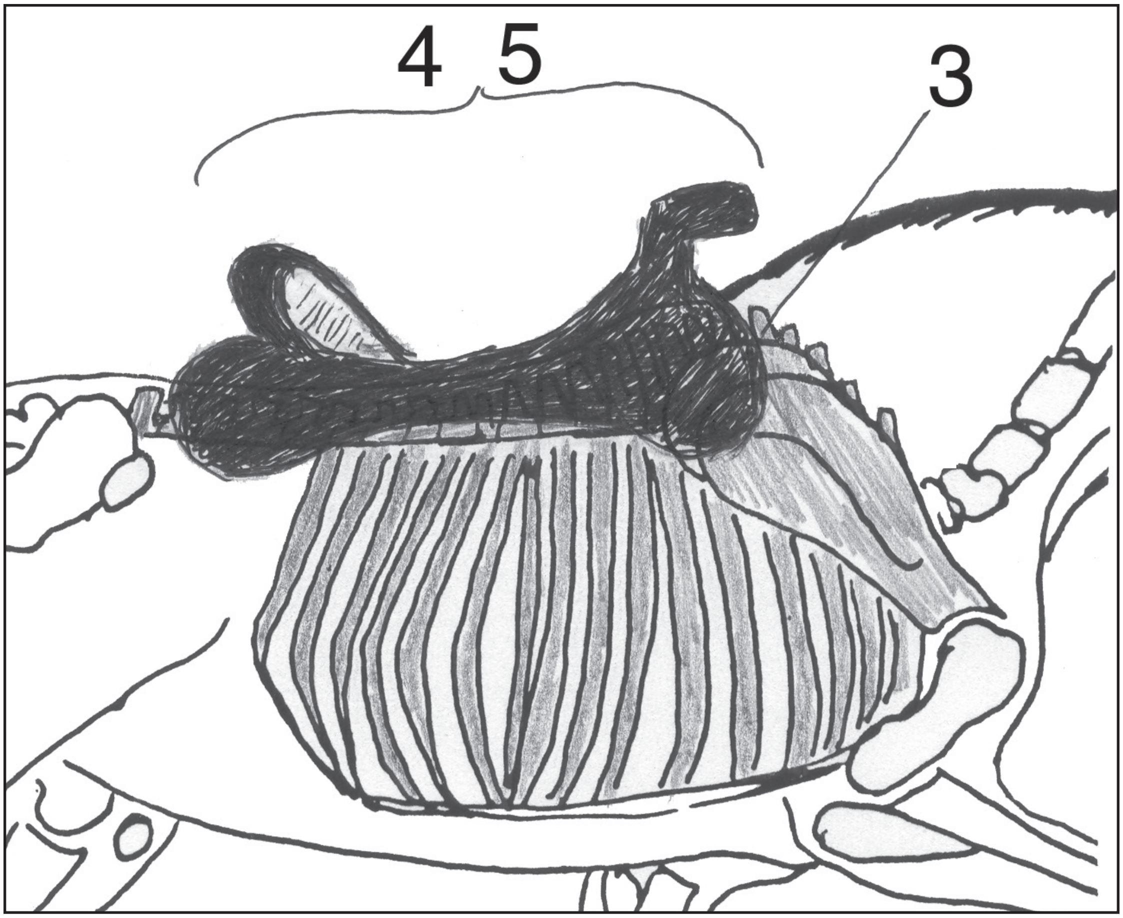
Many saddles are placed too far forward on the horse's back and therefore put pressure on the shoulders. To correctly place



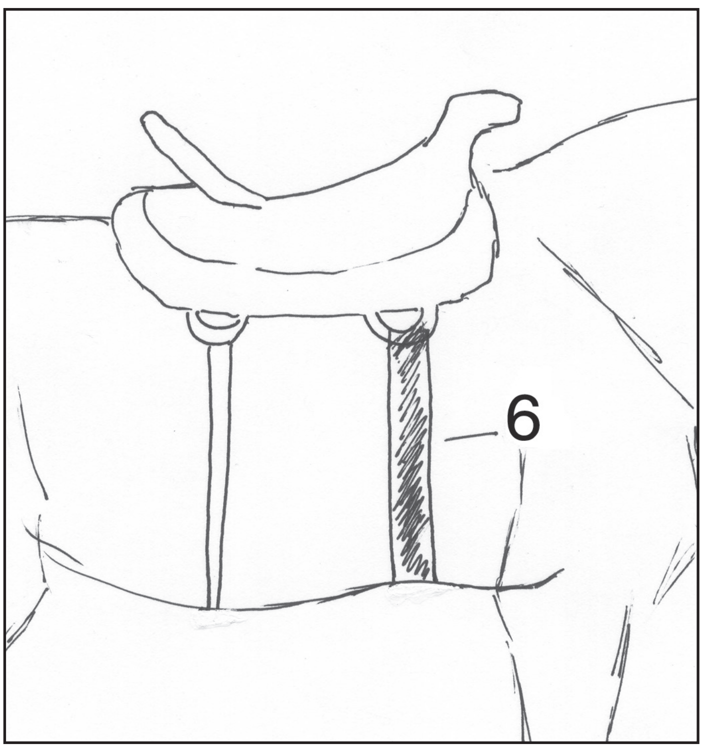
Saddle too wide. It is pitching down in front; therefore it:
1. Hits the withers.
4. Distributes the weight only on the front portion of the horse's back.
5. Does not match the contour of the horse's back (too wide in the shoulders).



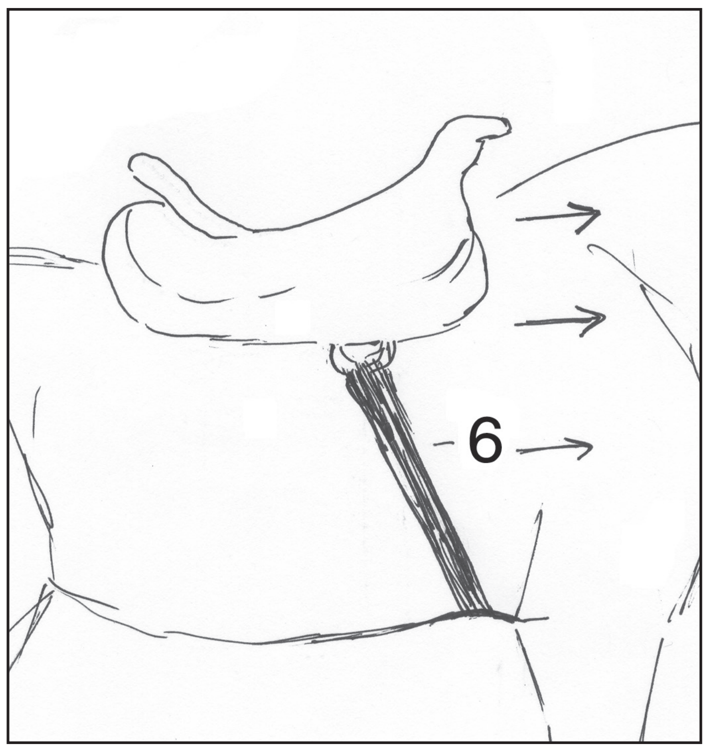
Saddle too narrow. It is sitting up in front and down behind. Therefore, it:
4. Distributes the weight only on the back portion of the horse's back.
5. Fails to match the contour of the horse's back by being too narrow for the shoulders.



The saddle is too long and flat. It is also bridging. It:
3. Sits on the shoulder.
4. Distributes the weight on four points—each side of the shoulders and each side of the loins.
5. Is too flat therefore; it does not match the contour of the horse's back.



The girth needs to be vertical so that the saddle does not shift either forward or back. Therefore:
6. The rigging on the saddle matches the girth line on the horse.



6. The girth line of the horse is more forward than the rigging on the saddle. Therefore, the saddle is going to be pulled forward onto the horse's shoulders by the girth.

your saddle, start with it a bit forward on the horse's shoulders and then slide it back into place. It should settle in behind the shoulder blade.

Check shoulder clearance when the horse is tacked with a rider on board. Stand on the ground facing the horse's tail. Place your hand between the saddle and the shoulder. Can you get your hand in? If not, then it is clearly too tight. It should feel like a well-fitting glove—snug but not tight. If there is a gap between the shoulder and the saddle, then the saddle may be too wide for your horse.

Carefully walk backwards as the horse moves forwards. Does the feeling of your hand between the saddle and the horse change? If it gets tighter or pinches your fingers then there may not be enough clearance for the shoulder.

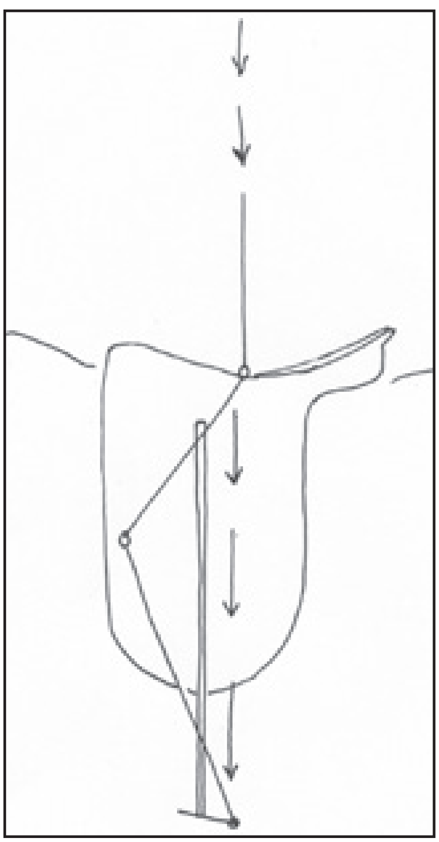
To recap so far, we have discussed to clear the withers, clear the spine and clear the shoulders. Pressure in these areas will restrict the horse's overall ability to move, cause the horse to put the weight on the forehand and make it very difficult if not impossible to be in self-carriage. By now you might be wondering what part of the horse is supposed to bear the rider's weight.

4. Distribute the weight on the long back muscles

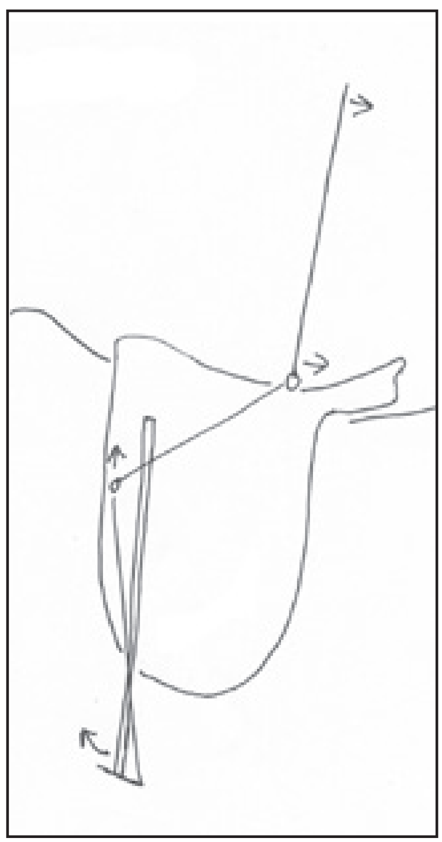
The rib cage area and the long back muscles are capable of bearing the weight of the saddle and the rider. When the horse's back is up, then the rib cage can support the rider easily. The width of the saddle and the shape of the bars or panels will determine how much of this area is utilized to distribute the rider's weight. If the bars or panels of the saddle are too narrow, the weight will be concentrated in a narrow band. If the shape of the panels are round instead of flat, then there will be increased pressure along the center of the panel. If the angle of the panel or bar is too steep (think "A" frame), all the pressure will be concentrated on a narrow area at the edge of the horse's back. Even though the panel looks large, it can function as a very narrow panel in this case.

Look at the underside of your saddle and feel the panels or bars. Check for evenness and for any protruding objects. I have found nails and staples sticking out on some saddles. Are the panels or bars wide, narrow, angular or overly round? This will give you some idea of how much actual weight-bearing surface area you are dealing with.

Now look at your horse. Locate the shoulder blade. Then slide your hand back from the shoulder blade toward the tail. It will drop into a little groove. Next locate the back edge of your horse's rib cage. Follow it up toward the spine. You will notice that as it curves upward, the ribs angles towards the front of the horse withers. In other words, they don't go straight up from that back edge. You might be surprised to realize just how short or long your horse's saddle area is.



Fitting the rider
The saddle is level and the rider is sitting in the deepest part of the seat, which is in the middle. The stirrup bar or fender is placed so that the rider's ankle is lined up underneath the rider's seat. The distance between the seat bones to stirrup bar is equal to the distance from the ball of the foot to the middle of the ankle.



The saddle is sitting low behind. The rider is sitting to the back of the saddle. The distance from the stirrup bar to the seat bones is much greater than the length of the ball of the foot to the ankle. The rider is in a chair seat.

5. Match the contour of the horse's back

The saddle area not only has length it has shape. In many ways it is similar to the way an airplane propeller curves, steeper at the shoulders and flatter toward the back. Different breeds have similar back shapes and there is great variation between individuals and breeds.

The overall contour of the horse's back determines the shape of the saddle. If the horse is very flat, then the saddle should have very little curve. Otherwise, the panels or bars will lift off the horse's back and put all the pressure in a very small area. If the horse has a bit of curve to his back and the saddle is very flat, the saddle will bridge. Bridging is when the pressure is on the four corners of the panel with a gap in the middle.

The saddle needs to match not only the length, but also the width of the horse's back. If the saddle is too narrow or too wide it will not sit level on the horse's back. An unlevel saddle will put excessive pressure either at the front or the back of the saddle area. This will not only be a problem for the horse, it will also cause trouble for the rider.

Place your saddle on your horse's back. Does the shape match the shape of your horse's back? Does it extend beyond the length of the rib cage? If so, it can put pressure on the horse's loins, which definitely is not a good place for your weight to be. Press alternately on the cantle and pommel. Does the saddle rock? Run your hand underneath the panel or bars. Is there a gap or increased area of pressure along the length of the saddle? Lift the horse's back up and see how much this changes. Ideally, when the horse raises his back into a working outline, there is even contact through the entire underside of the saddle.

6. Match the girth line of the horse

Everything else about the saddle can pass the test, but if the girthing isn't right, the entire fit could be ruined. The rigging or billet straps on the saddle needs to line up with the girth line on the horse. The girth line is the groove in the horse's sternum. Generally it is behind the elbow. Run your hand along the horse's sternum and feel for the girth line.

Place your saddle on the horse and pull the rigging or billets straight down. See if it lines up with the horse's girth line. Then girth up the horse and see if it is still vertical. If it lines up –terrific! If not, here's what can happen.

Basically, if the girth line is forward of the billet straps, the saddle will most likely ride forward onto the horse's shoulders. If the girth line is behind the rigging, the saddle could shift back. Of course, there can be other variations depending on the shape of your horse's shoulders. Chances are if the rigging or billets and the girth line don't match up, the saddle is going to shift around.

What the saddle has to do to fit the rider

In theory, fitting the rider is much simpler than fitting the horse. In reality, it can be just as difficult given that there is so much individual variation among riders. Mass-produced saddles are made for the average person. I am still not sure what the average rider is. People who are clearly not average (pants inseam of 34" or more) are going to have a hard time, especially if they ride a short-backed horse. For most types of riding, here's what to look for.

Saddle sitting level on the horse's back

The saddle needs to sit level on the horse's back. If the saddle is sitting low in front, it will pitch the rider forward. If the saddle is low behind, it will put the rider in a chair seat. Also, an unlevel saddle will make it impossible to accurately judge the following criteria for good rider fit.

Ideally, the deepest part of the seat is central in the saddle. This will allow the rider's weight to be evenly distributed across the horse's back. If the saddle parks the rider against the cantle, there will be excessive pressure placed on the horse's lower back.

Seat bone to stirrup bar relationship

The distance between the deepest part of the saddle's seat and the placement of the fender or stirrup bar is critical to overall fit for the rider. The stirrup needs to hang so that the rider's ankle is underneath their hip (except for jumping saddles). This will allow the rider to sit in the classical ear, shoulder, hip, and ankle alignment. A quick rule of thumb is that the distance from the ball of your foot to the center of your ankle is equivalent to the distance from the deepest part of the seat to the stirrup bar.

Twist of the saddle

The twist or waist of the saddle can be wide or narrow depending on how the saddle is constructed. If the twist is too wide, it can feel like you have a dinner plate between your legs. If it is too narrow, you might feel like you are sitting on a knife blade. Bottom line, the twist needs to match the width of your pelvis and be comfortable.

Openness of the seat

Some people need more room at the back of the seat, while others need less. The cantle area of the seat can have a lot of curve or be open and flat. Depending on the size and shape of your buttocks, you could use something with a bit more or less room.

These are just the basic points to consider when fitting a saddle to a horse and rider. Each individual will have particular issues to consider. Finding a saddle that addresses your individual needs is the challenge. However, the joy and freedom of riding in a well-fitting saddle that fits your horse is immeasurable. Many people discover that after spending a fortune on vet bills, training, and lessons, they were sitting on the problem all along. So don't despair. Finding the right saddle is well worth the effort. Good luck!