Data and visual evidence for the bit-free debate

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"… it was a nasty thing! Those who have never had a bit in their mouths cannot think how bad it feels." (Anna Sewell, Black Beauty, 1877)

SUMMARY

The bit/bit-free debate began 24 years ago when it was first proposed that use of the bit denies the horse two basic needs; the ability to breathe without hindrance and to be free of pain (Cook 1999). Since 2000, four developments in the horse world have occurred:

- *After over 5000 years of use, the bit has finally been subjected to scientific scrutiny and found to be inhumane, unsafe and unnecessary.*
- *Recreational riders in large numbers worldwide have become bit-free riders.*
- *The Five Domains Model for animal welfare assessment has been formally adopted by World Horse Welfare, the International Federation of Horseracing Authorities, Pony Club Australia and many other veterinary and equestrian organizations.*
- *The public have become aware of horse welfare issues and are questioning the social license of equestrian sport.*

The bit method of rider/horse communication inflicts the horse with three common and serious side effects; pain, suffocation and fear. Horses express aversion to the bit in their behavior. 67 behavioral signs of bit-induced pain have been identified so far (Cook and Kibler 2018). The evidence indicates that there are not less than 30 bit-induced diseases and that bit-free trials will reveal more. For example, there are good reasons for predicting that, in horseracing, the bit will be shown to be a common cause of premature exhaustion, catastrophic accidents and sudden death.

The evidence has wrongfooted most equestrian sports, the mandated-bit rules or standard practice for which are based on the long-standing myth that the bit controls the horse. Changing course for a 'big ship' like equestrian sport will not be easy but, as the benefits of bit-free equestrian sport are substantial, my hope is that the current crisis will be seen as an opportunity to correct an ancient mistake and usher in a new age for the horse.

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INTRODUCTION

The purpose of this article is to provide an easily accessible, illustrated resource for all equestrians on the evidence why

- Horses dislike the bit.
- The painful, unreliable and dangerous bit-method of human/horse communication is unnecessary, contraindicated and counterproductive.
- Bit-free riding is safer, improves performance, will sustain the social license of equestrian sport, and benefit both horse and rider.

A working knowledge of the evidence is a first step, and the second step is to gain personal experience of the many benefits of bit-free riding. As opportunities need to be available for riders to compete in equestrian sport, I urge administrators of all disciplines to conduct bit-free trials and, in due course, to allow bit-free competition. My recommendation is that bit-free competition be allowed, perhaps on a case-by-case basis in the first instance until further data is gathered and the rules can be changed.

As use of the bit is a welfare issue, it is necessary to state how equine welfare is to be assessed. Until quite recent years that would have been a difficult question to answer. But thanks to the pioneering work of Professor David Mellor, the Five Domains Model (Fig.1) has become the widely accepted gold standard for the assessment of animal welfare in a range of species, having been adopted already by over 60 organizations including Thoroughbred Racing New Zealand (Mellor and Burns, 2020, Mellor et al 2020), the International Federation of Horseracing Authorities, World Horse Welfare, the British Veterinary Association (2021), Racing Victoria, Pony Club Association of Australia, Equestrian Australia, Racing Victoria, Harness Racing Victoria, Queensland Racing Integrity Commission, Harness Racing New Zealand and the Veterinary Associations of Australia and New Zealand.

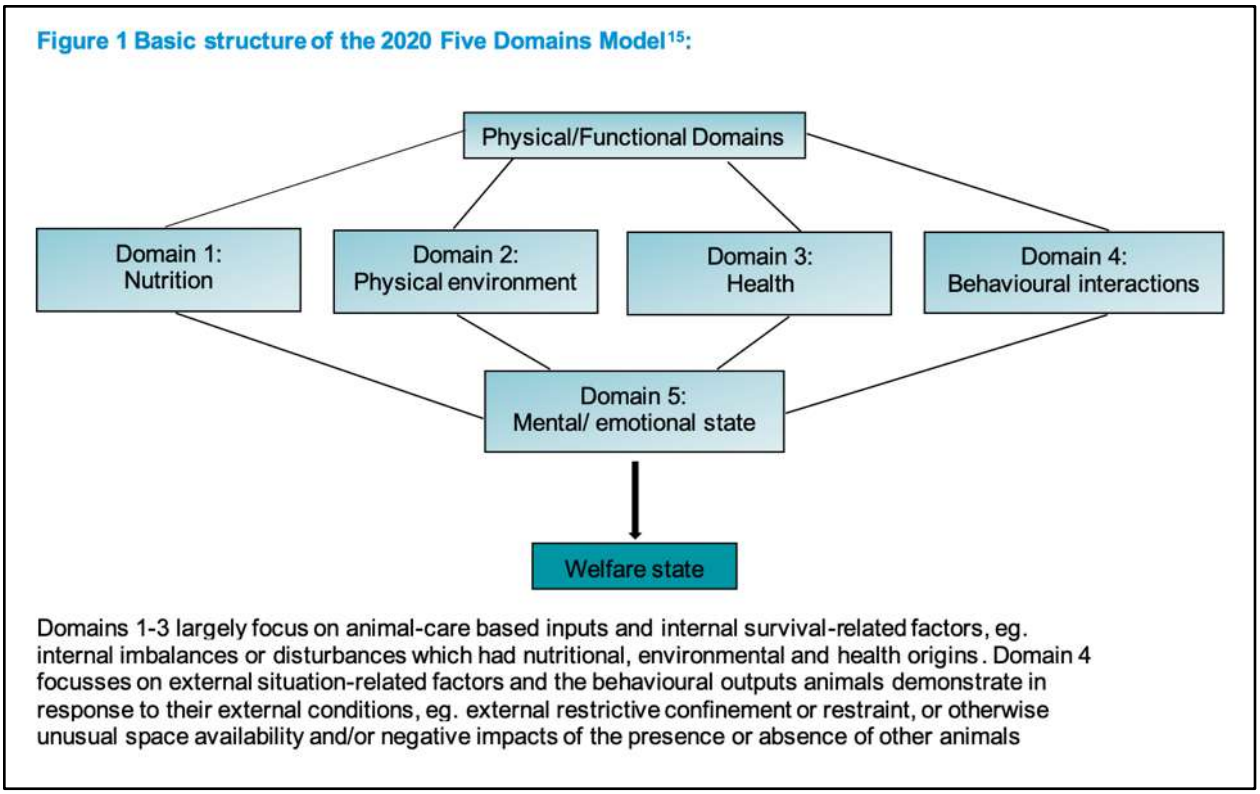


Figure 1. Basic Structure of the 2020 Five Domains Model. Behavior is a visual demonstration of any compromise of a horse's mental/emotional state.

(Graphic courtesy of Cristina Wilkins, "Horses and People.")

In 2023, Pony Club Australia became the first equestrian administration to allow bit-free riding in all disciplines. An announcement on July 4th, 2023, explains its ground-breaking significance.

"World Bitless Association congratulates the Board for their progressive and forward-thinking decision on bridle equality! May they lead the world!

Pony Club Australia have made the progressive change to allow riders to apply for an exemption to ride bit-free on the grounds of horse welfare, in response to the proven demand from Junior riders. As of last week, Pony Club Australia have updated the Bitless Bridle tack rules so that any rider, of any age, can apply for an exemption, not just for their rally days, but for any competition across any discipline. Pony Club Australia said they have already seen riders compete in dressage, jumping and eventing competitions bitless. Bitless bridles allowed included sidepull but have now been extended to crossunder and bosal styles as well. The gear rules will be revisited in November by the World Bitless Association gear committee, for our next update on 1st January 2024."

For millions of years, the horse has evolved to reject anything in its mouth that is neither food nor water. A horse's instant and reflexive rejection of any other item is overlooked by a principle of dressage that requires a horse to "*accept the bit*" and by a rule in any discipline of equestrian

sport that either mandates use of a bit or regards it as standard practice. To expect a horse to 'accept the bit' is an unrealistic expectation. A bit is an oral foreign body and incompatible with the physiology of the horse. To mandate that a horse must wear two bits is to double-up on the first mistake. When one bit fails, better by far to remove it rather than to add a second more painful bit.

Since the Iron Age, the design of the bit has undergone many changes but its mistaken intent to control by pain has remained unchanged (Cook 2023). Today, two bits are often used instead of one and pain is referred to euphemistically in the phrase 'pressure and release.' Whatever we choose to call it, a horse senses no difference between 'pressure' and pain. The effect is the same, sometimes resulting in a rider's complete loss of control. Contrary to what was clearly assumed when the bit was first introduced, the infliction of pain is contraindicated and counterproductive.

The horse is an extremely sensitive animal with an exquisite sense of touch (Fig 2).

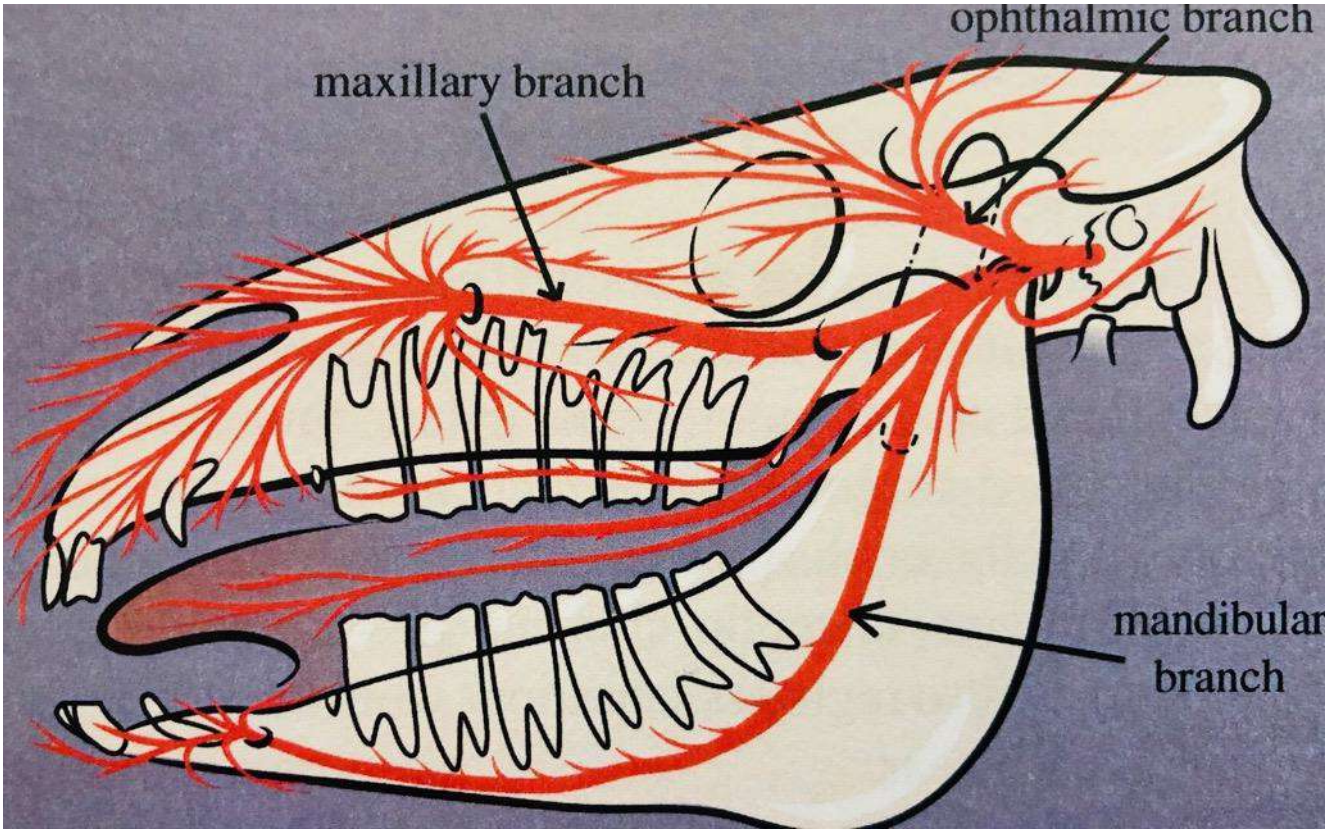


Figure 2. The three sensory branches of the trigeminal nerve. Note that the two nerve branches to the tongue are also part of the mandibular branch and that this large nerve supplies all the regions of the mouth that are repeatedly, daily, and painfully stimulated by the bit, i.e., the lips, tongue, and bars of the mouth. Headshaking in the bit-ridden horse is the all-too-common sign of trigeminal neuralgia, a disease in human medicine notorious for its excruciating pain. Note the presence of an unerupted 'wolf' tooth immediately in front of the first lower cheek tooth.

A horse can sense the presence of a single fly landing on any part of its skin. Lips are an especially sensitive part of the skin sense organ. So also, are the first two sections of the

digestive tract, the oral cavity and the throat (see Fig.9). The tongue alone is a sense organ *extraordinaire.* A bit transmits a signal to the horse's brain that is far too powerful. Apart from causing pain, the sheer intensity of the signal will introduce what, in engineering terms, is referred to as signal 'noise.' As a result, a horse either misunderstands the signal or, quite understandably, resents it and takes evasive action. Hence the abundance of what are listed as 'conflict behaviors' and 'evasions of the bit.' Horses quickly learn bit-induced conflict behaviors. Some learn a mental state like post-traumatic stress disorder in man, i.e., 'learned helplessness'. A few become too dangerous to train. As explained below, a bit strangles and suffocates. In the racehorse, this explains the cause of premature exhaustion, falls, catastrophic accidents and sudden death (Fig.3).

Figure 3. Thoroughbred in training bit-ridden with tongue tie, draw reins, and hyperflexion of neck. Facial expressions (mouth, ears, eyes, nostrils) clearly show anxiety and discomfort. (Creative Commons CC0)

In sum, the myth that the bit controls a horse is precisely that – a myth. A bit does not control and is a common cause of complete loss of control. Its use should be disallowed not defended. A bit-free strap-on-skin method of communication is sufficient and much to be preferred to a bit-on-bone method that causes pain, fear and suffocation.

Horses were ridden bit-free long before they were ever bit-ridden. Since 2000, a burgeoning bit-free movement has developed worldwide and, contrary to expectations, reports of accidents have been noticeable by their absence.

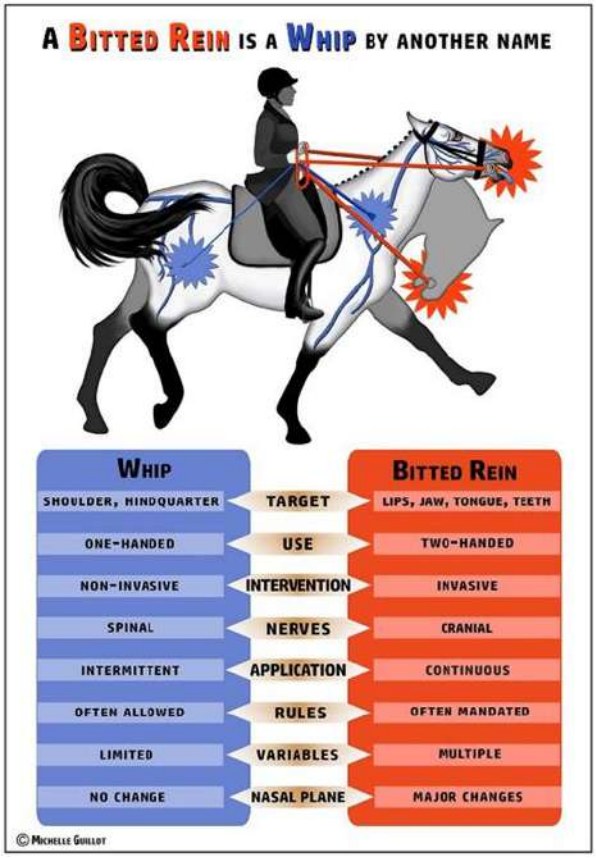
Pioneering riders who were unhappy with what their bit-ridden horses were telling them, have shown by example that bit-free riding ...

- Dispels the tension and nervousness of the bit-ridden horse.
- Allows a bit-free horse to achieve a calm mental state.
- Results in more reliable signaling, fewer conflict behaviors, and improved performance.

In all equestrian sports, horseracing in particular, I predict that if bit-free competition was allowed, the incidence of the following problems will be significantly reduced:

- Sudden death and catastrophic accidents.
- Negative pressure pulmonary edema ('bleeding').
- Wastage from premature retirement for health and behavior reasons.
- The aftercare problem will be eased as racehorses will be retired in better health for second careers.
- The social license of equestrian sport will be sustained (Cook 2023).

Shunning all euphemisms, a metal-tipped rein is a whip by another name.



It differs from the traditional whip, limited use of which is currently permitted on the skin of a horse's quarters or shoulder. A bit is a pressuring, pain-producing device implanted in a sensitive body cavity. In racing, a tongue-tie is also permitted. As has been remarked, *"... if the same routine treatment was inflicted on a horse outside a racetrack, the perpetrator would almost certainly be prosecuted."* (Monty Roberts). The Australian Prevention of Cruelty to Animals Act, 1979, gives the RSPCA the power to file suits under the act, as does the United Kingdom Animal Welfare Act. See Figs.4-8 for tangible evidence of a bit being bad for a horse's mouth.

Figure 4. If a dentist placed as much equipment in your mouth as this and kept it there for 30 minutes under pressure, how would you feel?

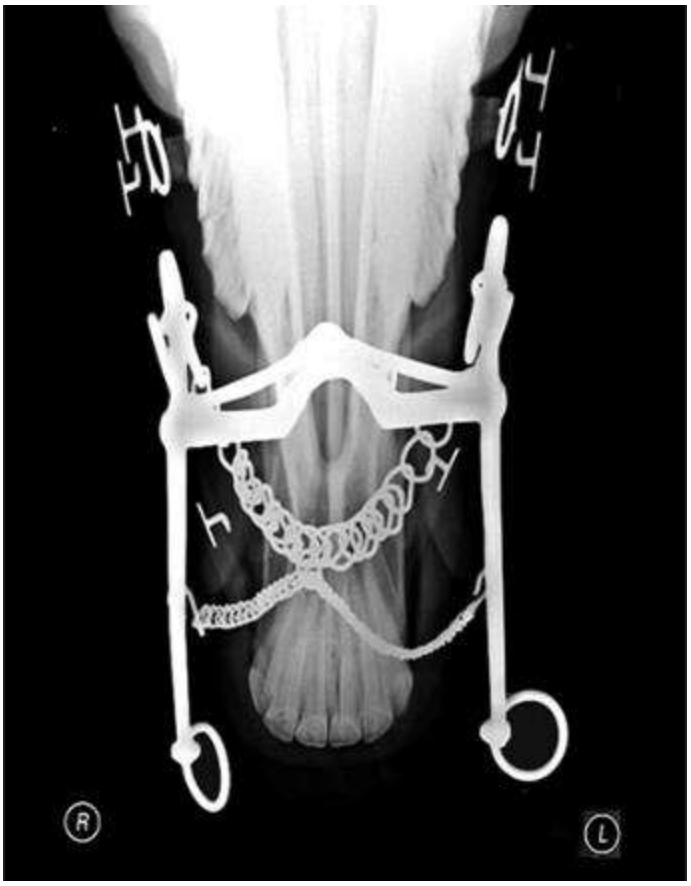


Figure 5. Dorso-ventral radiograph of a horse harnessed with a double bridle. Unsurprisingly, in a questionnaire survey of 66 recreational riders, the most frequently noted conflict behavior was "My horse hates the bit" (Cook and Kibler 2018)

Figure 6. A view of a double bridle that is normally out of sight but always 'on the mind' of a horse, causing pain, a 'noisy' brain, and negatively affecting a horse's mental/emotional state. Note how the curb bit presses down on the side of the jawbone, close to the mental foramen, from which emerges the mental branch of the Trigeminal nerve, sensory to the bars of the mouth, lower incisor teeth, and two of the most sensitive areas of skin, the lower lip and chin (Latin: mentum*). Note too how a snaffle applies pressure to the bars of the mouth at a point where unerupted wolf teeth are frequently present (Fig 2). A snaffle may cause chip fractures on the prow of the first lower cheek tooth and is frequently responsible for erosion of the prow and grinding surface of this and other cheek teeth (Figs 15-18).*

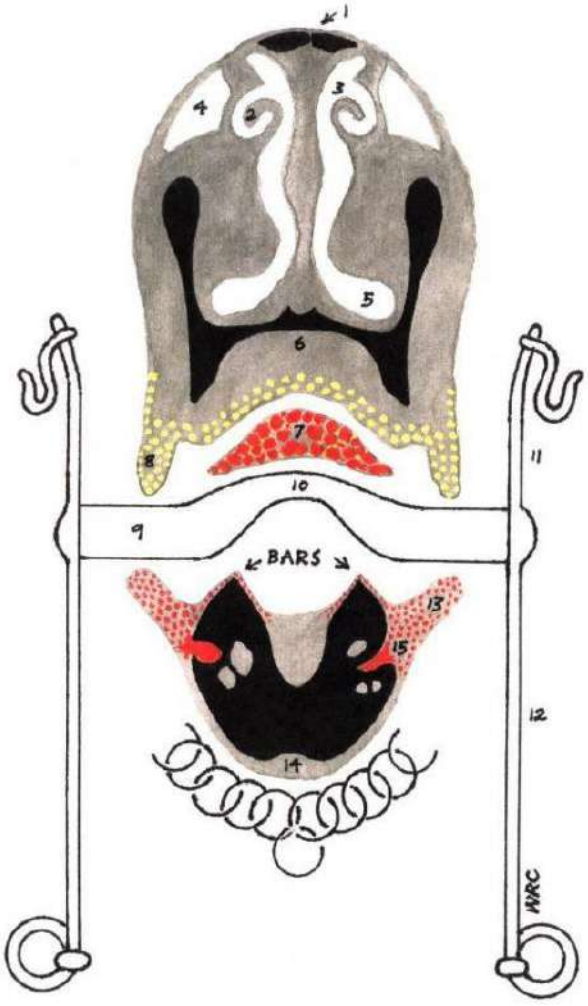


Figure 7. Note that the bars of a horse's mouth are not flat 'tables' *of bone as the word suggests but a* 'knife edge' *of bone. The number 15 marks the emerging mental nerve, a branch of the Trigeminal. 7 = tongue; 13 = lower lip*

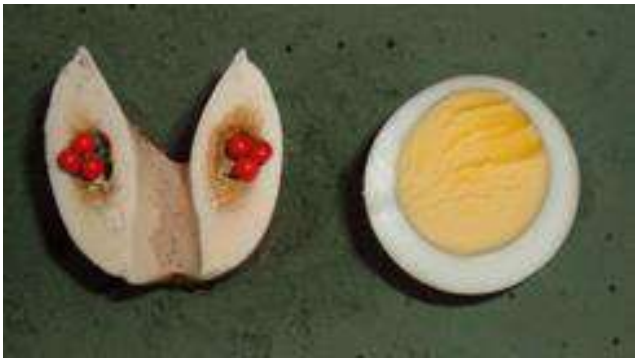


Figure 8. A transverse section of the interdental space ('bars' of the mouth) at a level just behind the mental foramen, of an above-average size horse compared with a mid-section of a standard-size hen's egg. Red beads represent fibers of the mandibular nerve, also known as the "mental nerve."

To understand why the bit is bad for breathing, it will help to have some understanding of the basic mechanics of the horse's throat. Figure 9 is a diagram that readers will refer to again later.

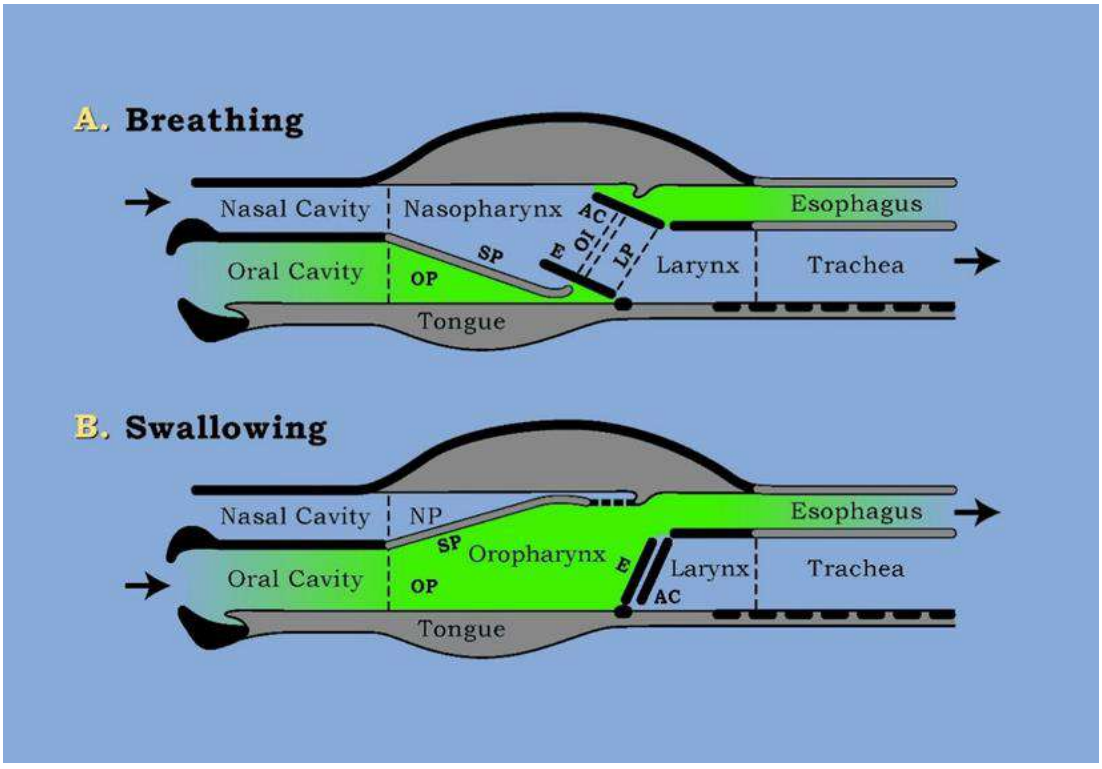


Figure 9. The naming of the parts for the breathing/swallowing switch point.

AC = arytenoid cartilage; E = epiglottis; LP = laryngopharynx; OI (Ostium Intrapharyngium) = the 'buttonhole;' NP = nasopharynx; OP = oropharynx ('throat'); SP = soft palate

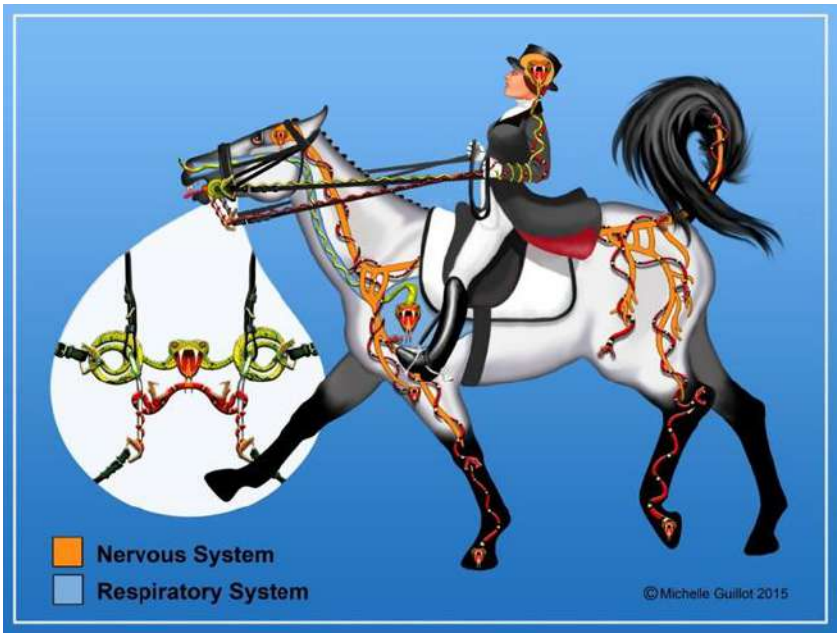
Bit-ridden horses' feelings on the debate have been sought on three occasions (Cook and Mills 2009, Cook and Kibler (2018, 2022). On each occasion, horses clearly expressed their preference for being ridden bit-free. On the first two occasions, they expressed their opinion directly. On the third, they expressed it indirectly by sending their message to the rider. On each occasion, the human stakeholders recognized that they too benefitted from riding bit-free.

The first trial (Cook and Mills 2009) was witnessed by delegates to the 2008 conference of the Certified Horsemanship Association (CHA). Copied below is a precis of the summary.

Four mature, school horses, none of which had ever been ridden in a crossunder bit-free bridle, were ridden by four CHA certified instructors through two 4-minute exercise tests, first bitted then bit-free. The tests were marked by an independent CHA judge. The average score was 37% bitted and 64% bit-free.

The second trial (Cook and Kibler 2018) was a questionnaire-based, behavioral assessment of pain in 66 horses, with and without a bit. Removing the bit reduced 67 behavioral indices of pain from a population total of 1575 pain indices when bit-ridden to 208 when bit-free; a reduction of 87%.

The third trial from the same population (Cook and Kibler 2022) assessed the effect of bit-induced pain in the horse on 45 of the riders about riding. When using a bit, riders reported 200 negative feelings about riding. When bit-free they reported 18, a reduction of 91%. Conclusion: The rider's feelings were negatively influenced by their horse's aversion to the bit.



A bit in the mouth of a horse at exercise generates digestive system responses in opposition to the respiratory system responses that are required.The pain of a bit is very much 'on the mind' *of the horse and this can lead to unscheduled musculoskeletal responses such as rearing, bucking and bolting or a freeze response at a jump. Whether or not the rider is aware, a horse may exhibit fear responses, such as a flashing tail.*

Detailed and well-authenticated scientific findings support the conclusions from these three trials that use of a bit inflicts pain and denies the ridden horse an unhindered ability to breathe (Mellor 2016, 2019a, 2019b, 2020a. 2020b, Mellor and Beausoleil 2017, 2020, Mellor and Burns 2020).

In a peer-reviewed survey of 66 domestic-horse jawbones in museum collections, 62% showed bit-induced bone spurs on the bars of the mouth (Fig.10) and 61% showed bit-induced dental erosion (Cook 2010). [See Figs 11,12, 43,44]

Figure 10. Multiple large bone spurs on the right bar and one small spur on the left. A principle of saddle fitting is that the saddle should not press directly on bone. Bit usage breaches this principle.

Bit-induced bone spurs on both bars of the mouth, shown well in profile on the left bar.

Figure 11. Sculpted tooth roots of a healthy skull. No beveling of the first lower cheek tooth

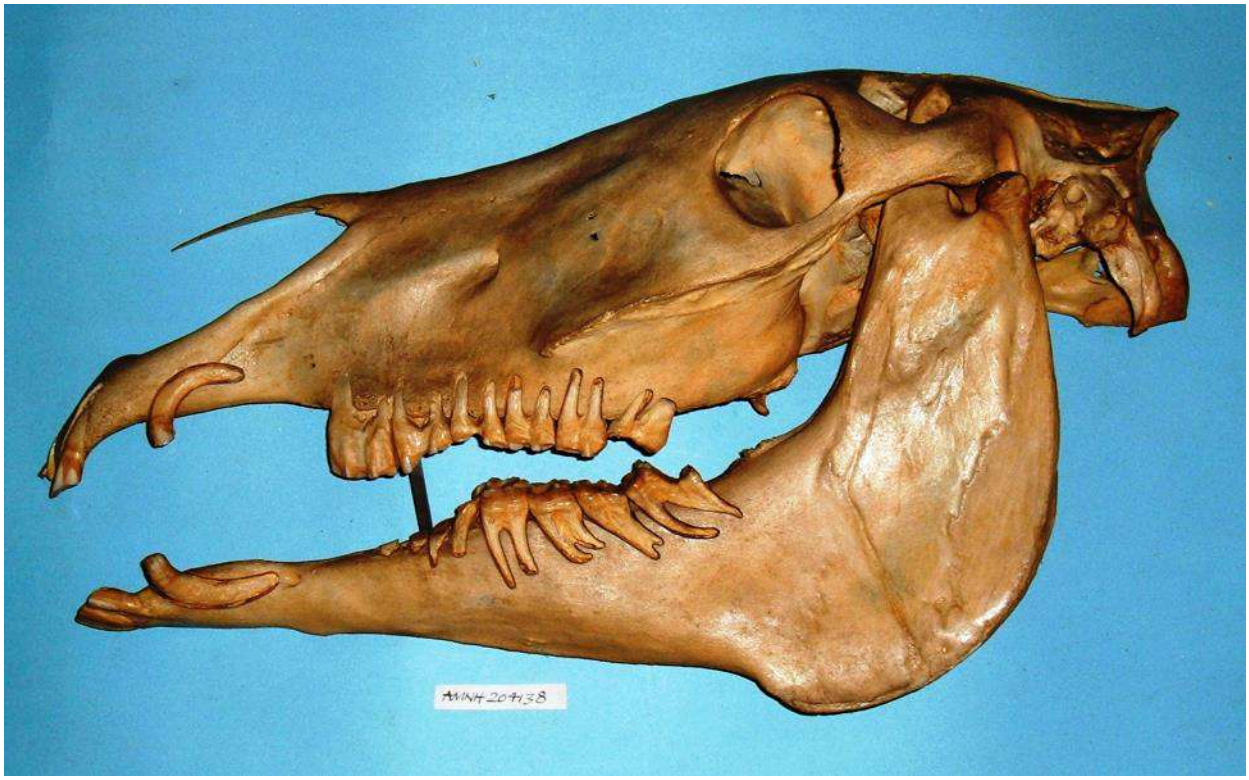
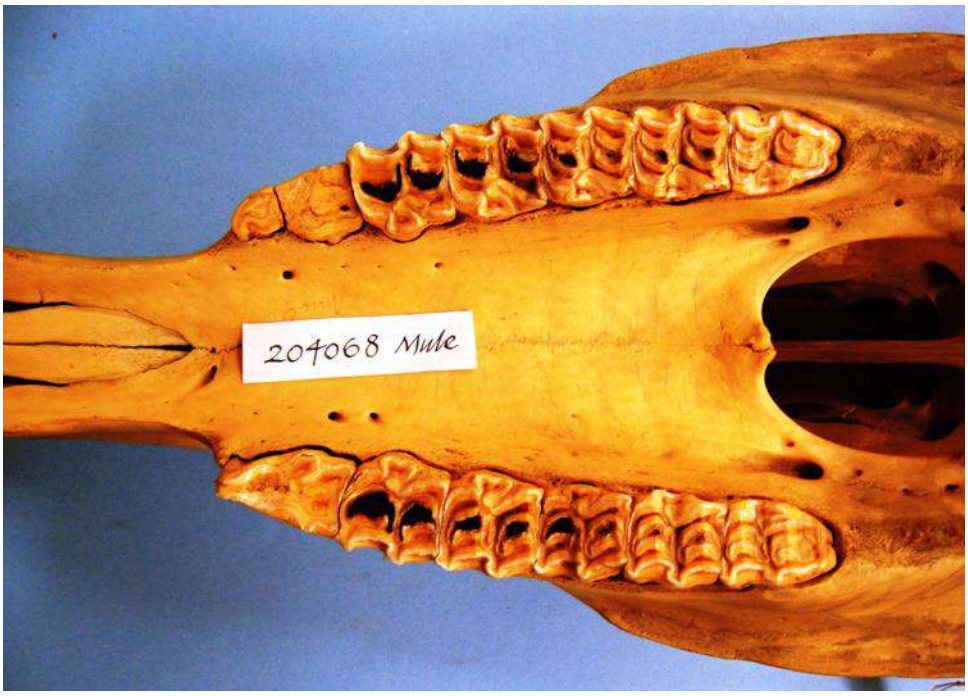


Figure 12. Sculpted tooth roots of an adult horse with loss of the first cheek tooth and severe bit-induced dental erosion of the second cheek tooth in the lower jaw, together with erosion of the second and third upper cheek teeth in the upper jaw; a 'wave mouth.' Note how the root of the lower canine tooth extends back to a point just short of the mental foramen and emerging trigeminal nerve. Canine teeth do not erupt until a horse is five. This means that during the most crucial years of a male racehorse's training, the bit will be applying pressure to a section of the bars under which are the developing tooth roots of the canine teeth.

Figure 15. The first lower cheek tooth shows severe bit-induced erosion of its grinding surface, as does the beveling of its prow. Multiple small bit-induced bone spurs are present on the bars of the mouth. Note the position of the mental foramen referred to earlier.

Figure 16. Bit-induced erosion of the grinding surfaces of the first five upper cheek teeth, providing evidence of the degree to which the commissures of the lips are stretched, and pain inflicted, to allow a bit to be drawn so far into the mouth.
(American Museum of Natural History)

Figure 17. Severe bit-induced erosion of the first cheek teeth in both upper and lower jaw. The result of a mule 'grabbing the bit'.



The same mule as in the picture above, showing erosion of both upper first cheek teeth (the tooth on the mule's left side is also fractured) and advanced caries of the second and third cheek teeth on both sides.

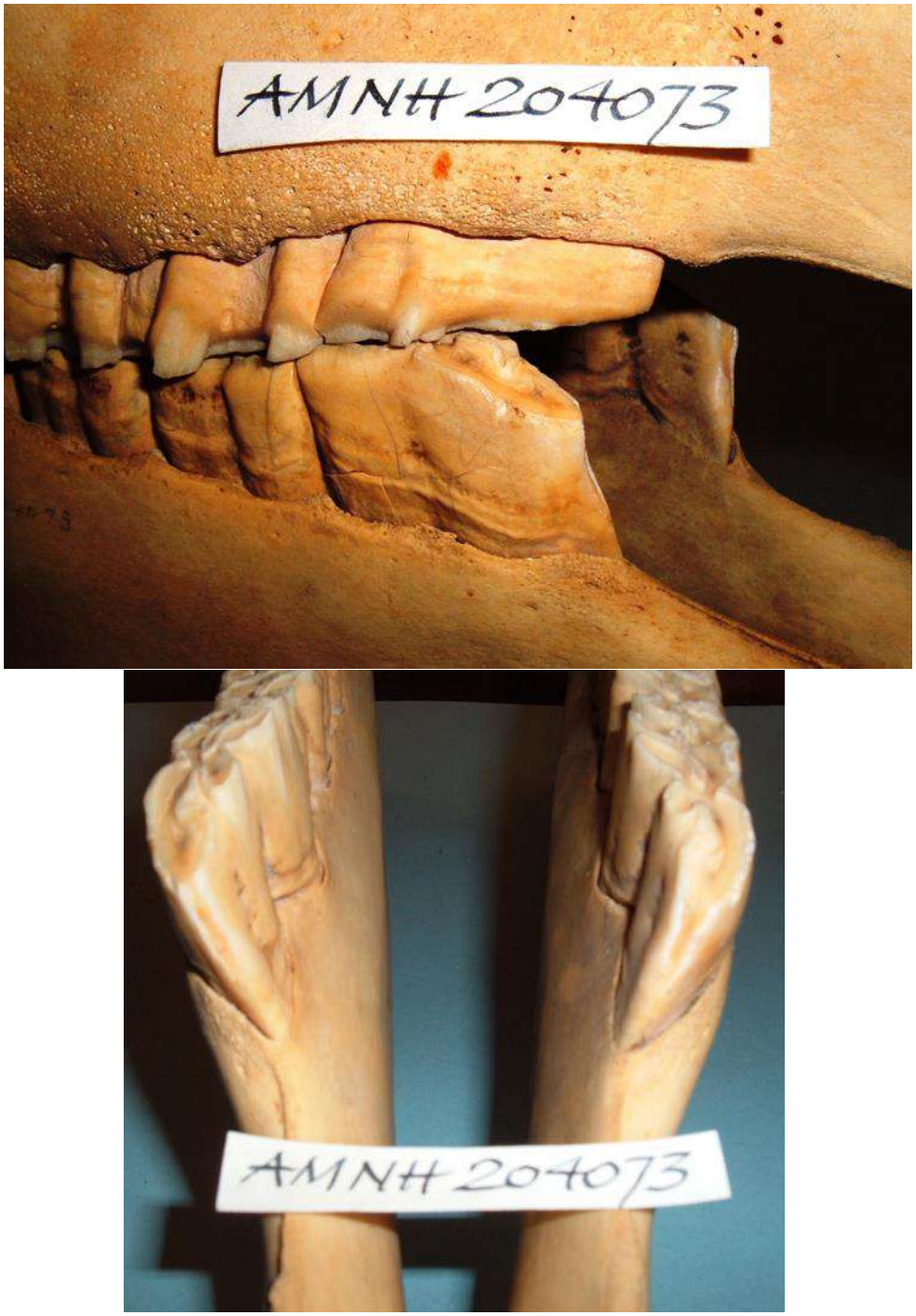
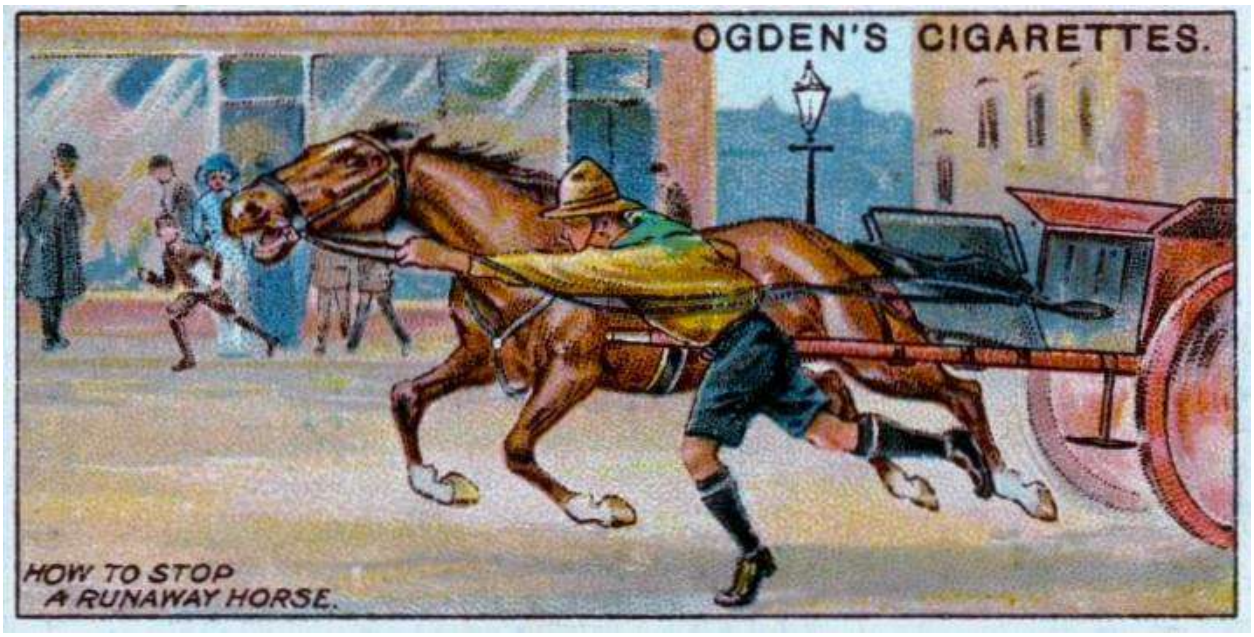


*Figure 18. In the top photo, beveling by the bit of the front half of the grinding surface. In the bottom photo, blunting of the prow of both teeth with erosion of enamel. (*American Museum of Natural History)



A better plan would be to avoid bit-induced bolting by not using a bit in the first instance, as pain and fear of the bit are common reasons why a horse bolts. Once a horse is in flight mode, increasing the bit-pain only escalates the problem.

Figure 19. An occasional consequence of bit usage. [Photo credit unavailable]

Figure 20. Bit-induced head tossing and mouth gaping

Figure 21. Bit-induced lacerations of the tongue (Photo credit unavailable)

Consequences of bit usage

These can be listed under two headings, bit-induced diseases, and abnormal behavior. To understand these lists it helps to understand three things about how a horse breathes:

1. A horse is a nose breathing animal. It cannot mouth-breathe. As can be seen by watching wild-horse videos, a horse at liberty runs with its head and neck extended, mouth closed and dry, and lips sealed (Fig.33).
2. One swallow with sealed lips prior to running establishes a negative atmospheric pressure in the oral cavity that keeps the horse's long soft palate firmly clamped to the root of an immobile tongue (Fig 31). (To experience the vacuum effect, try this swallowing maneuver yourself.)
3. An elastic sided buttonhole in the tail end of the soft palate is buttoned firmly around the entrance to the voice box with a second airtight seal, as shown in Fig 31.

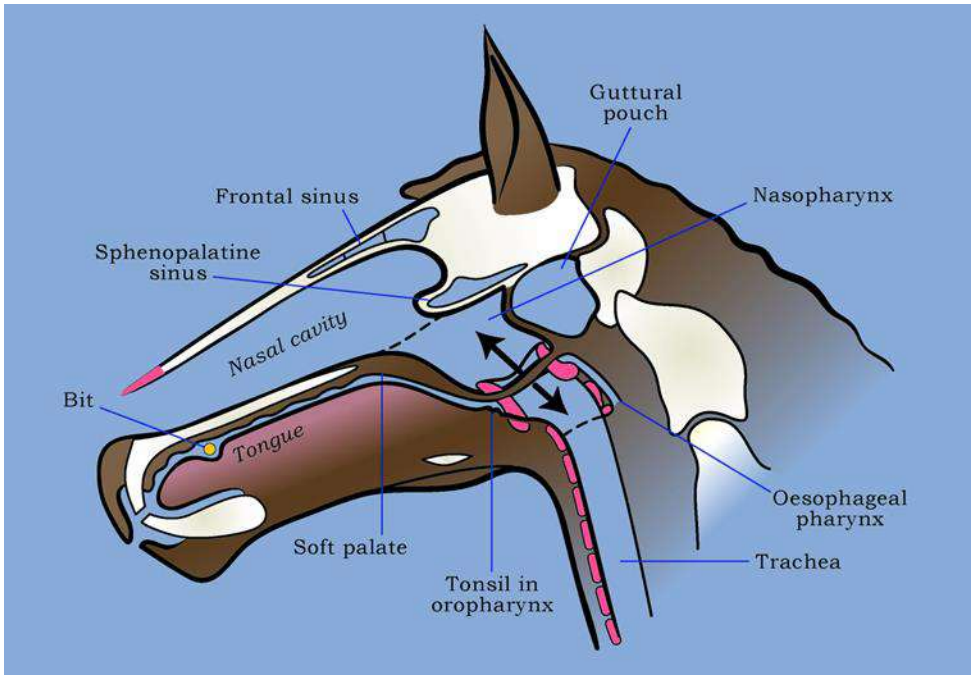


Figure 22. The lip is not sealed, so there is air in the oral cavity, but it can be imagined how, if the air were to be dispelled by one swallow with closed lips prior to running, this would adhere the soft palate to the root of the tongue (see Figure 31). Because the horse has a guttural pouch, the roof of the throat (nasopharynx) is partly composed of soft tissue, unsupported by bone. As both the floor and roof of a horse's throat are potentially mobile, this renders a horse especially vulnerable to strangulation.

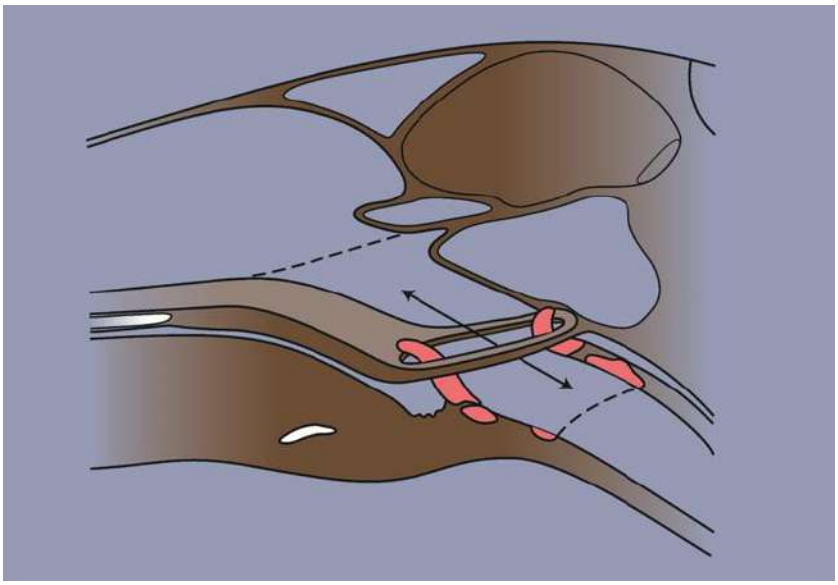


Figure 23. A perspective view of the throat shows the buttonhole in the tail-end of the soft palate. Because there is air in the oropharynx, the buttonhole is not clasping the voice box cartilages firmly. It can be imagined how easily the soft palate might become completely separated from the voice box, that is, become 'dorsally displaced,' causing a horse to choke and suffocate.

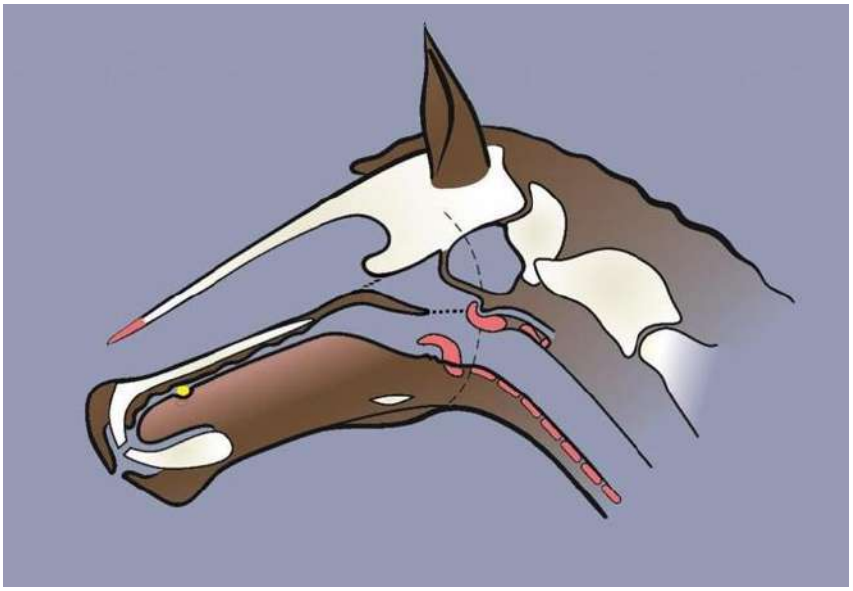


Figure 24. Bit-induced dorsal-displacement of the soft palate (the all too familiar acronym DDSP) during exercise. The lips are unsealed and the soft palate 'unbuttoned.' The short-interrupted line shows severe obstruction of the airway at the posterior nares (choanae). The long-interrupted line shows the soft palate 'buttonhole' released from the voice box 'grommet', further compromising the throat airway. This event, occurring during a race, could cause a horse to suffocate ('choke-up'); collapse and even die (e.g., from cardiac arrest triggered by stimulation of the trigemino-cardiac reflex). Less severe degrees of DDSP, I.e., palatal instability but without actual displacement, will still constitute significant obstruction (strangulation) of the throat airway.
Key: Yellow = the bit in the 'over-tongue' position

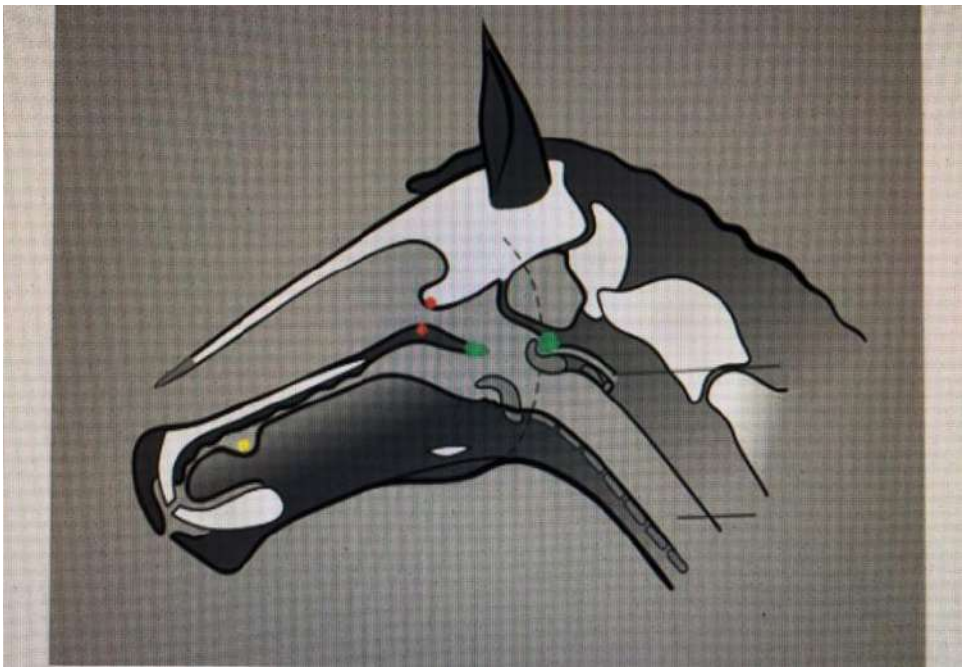


Figure 25. Dorsal displacement of the soft palate from the voice box. The red dots mark the airway obstruction at the posterior nares, I.e., the junction of the nasal and nasopharyngeal (throat) airway. The green dots mark the boundaries of the soft palate's buttonhole and a further level of airway obstruction (strangulation).

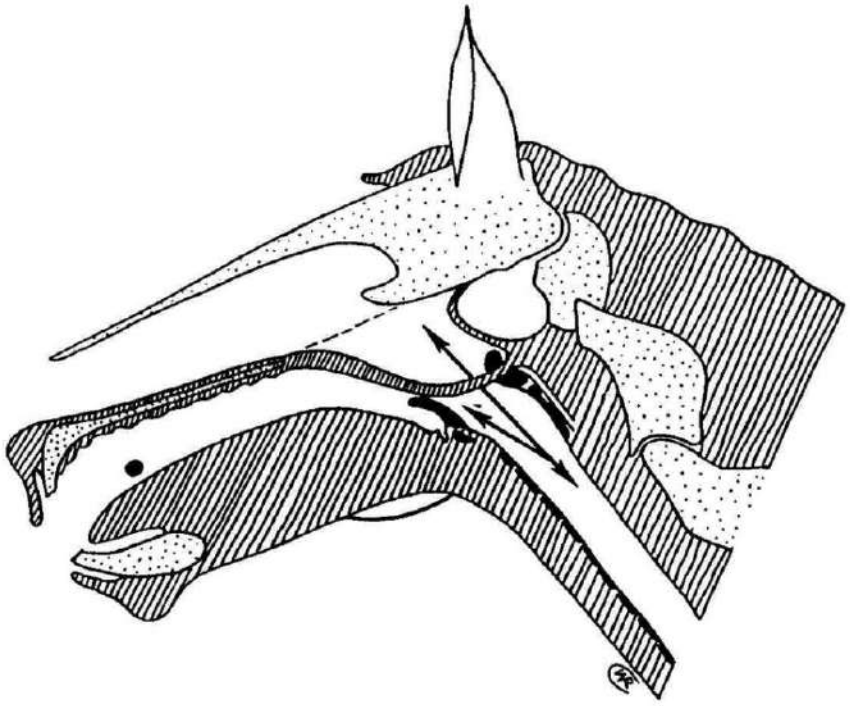


Figure 26. Unsealed lips and an open mouth resulting in dorsal displacement of the soft palate from the voice box.

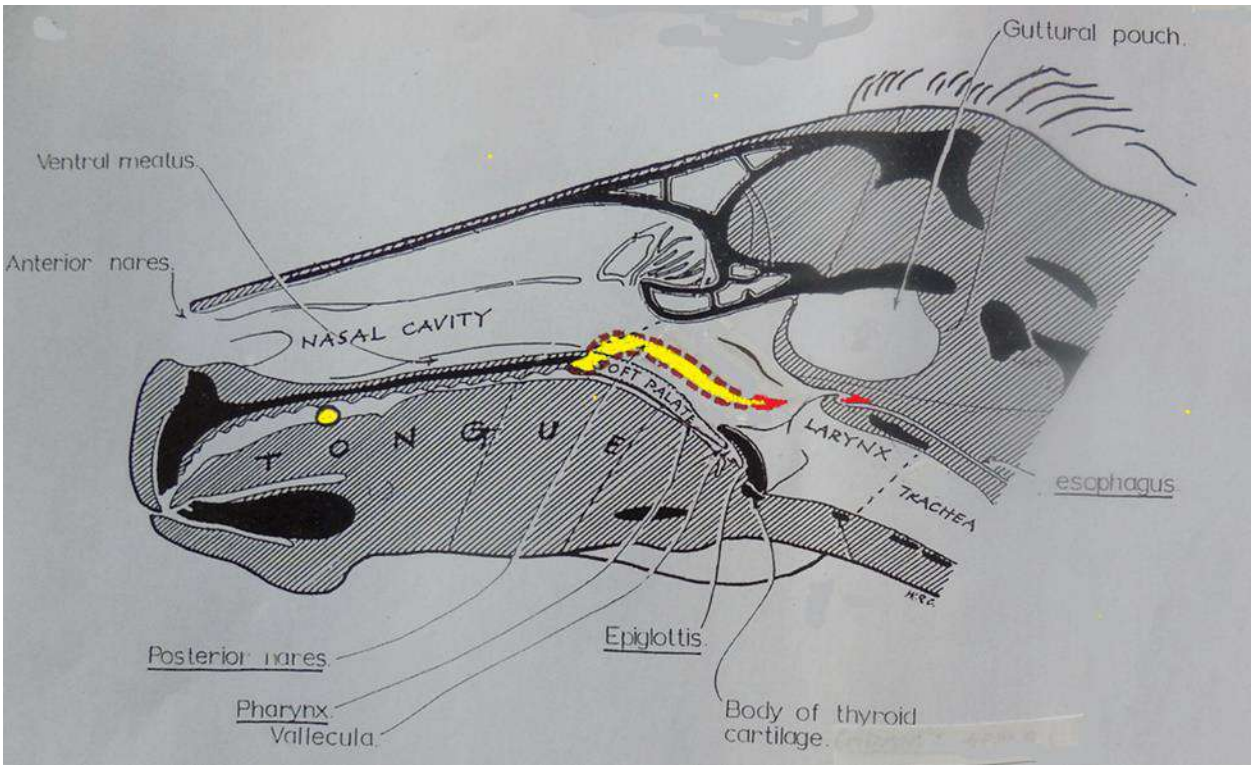


Figure 27. Shows how dorsal displacement of the soft palate (yellow with red border to its buttonhole) partially obstructs the airway at the nasal/throat junction and creates another serious bottleneck at the junction of throat and voice-box (larynx). The soft palate is a continuous sheet of tissue that stretches from its forward anchorage at the hard palate to its tail-end anchorage at the entrance to the gullet (esophagus), under the guttural pouch. At its tail end the soft palate has a buttonhole that, during breathing, should embrace the grommet-like voice-box. The elastic and muscular borders of the buttonhole normally serve as a connecting sphincter.

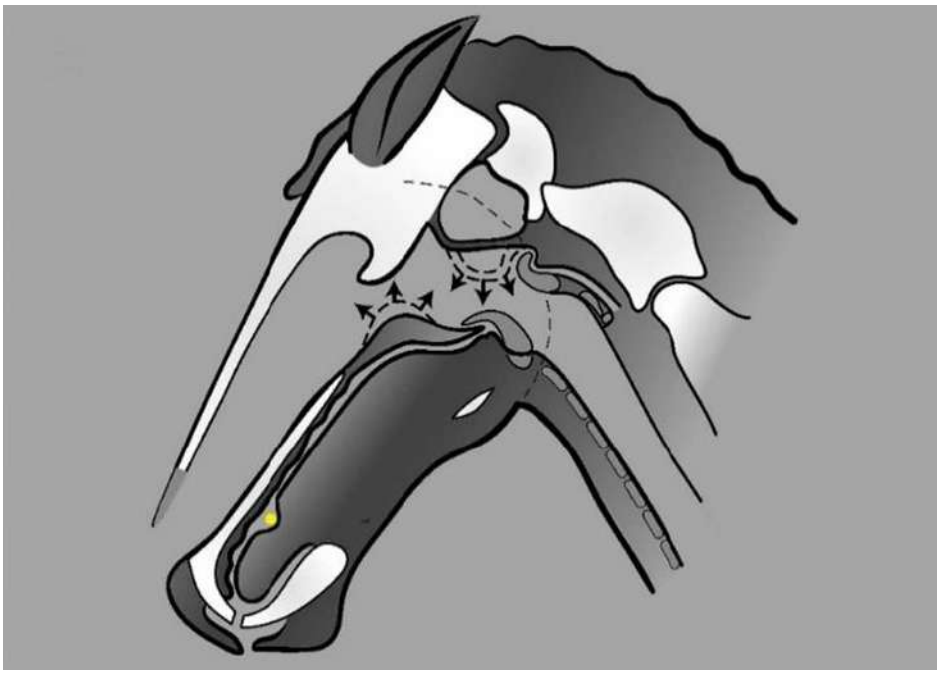


Figure 28. Illustrating obstruction of the airway during exercise from the effects of unsealed lips and poll flexion. This and further degrees of bit-induced head and neck flexion (e.g., nasal plane behind the vertical) increases the work of breathing and as determined by Poiseuille's law, causes pulmonary barotrauma (bruising of the infinitely delicate air sacs of the lungs, i.e., 'waterlogging' and 'bleeding'). Additional 'throttling' occurs from dynamic collapse of the throat airway at each inspiration, as indicated by the arrows.

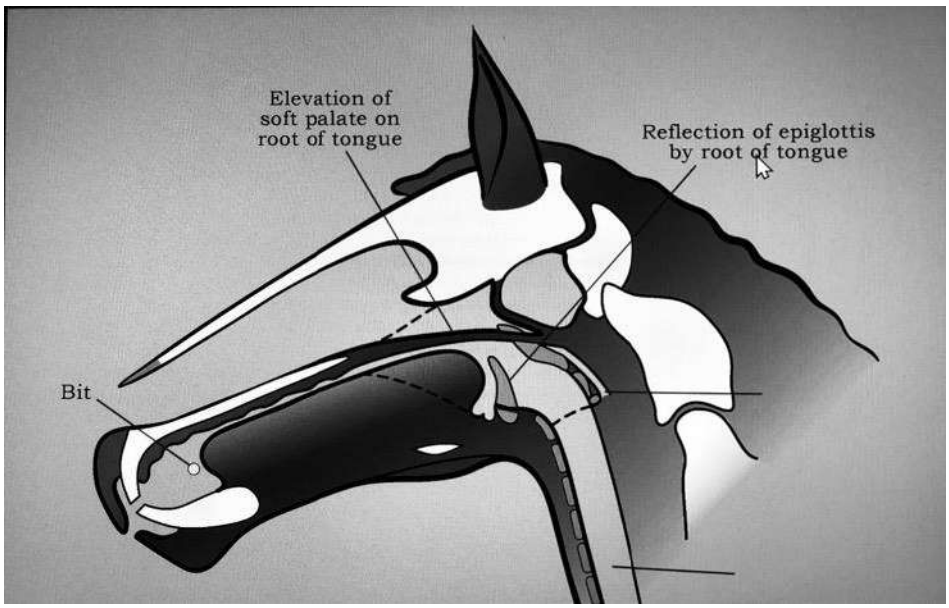


Figure 29. The tongue has the physical qualities of a water-filled bag, a change of its shape does not alter its volume. Retraction of the tip of the tongue behind the bit causes the root of the tongue to bulge, displacing the soft palate and pushing the epiglottis over the entrance to the voice box.

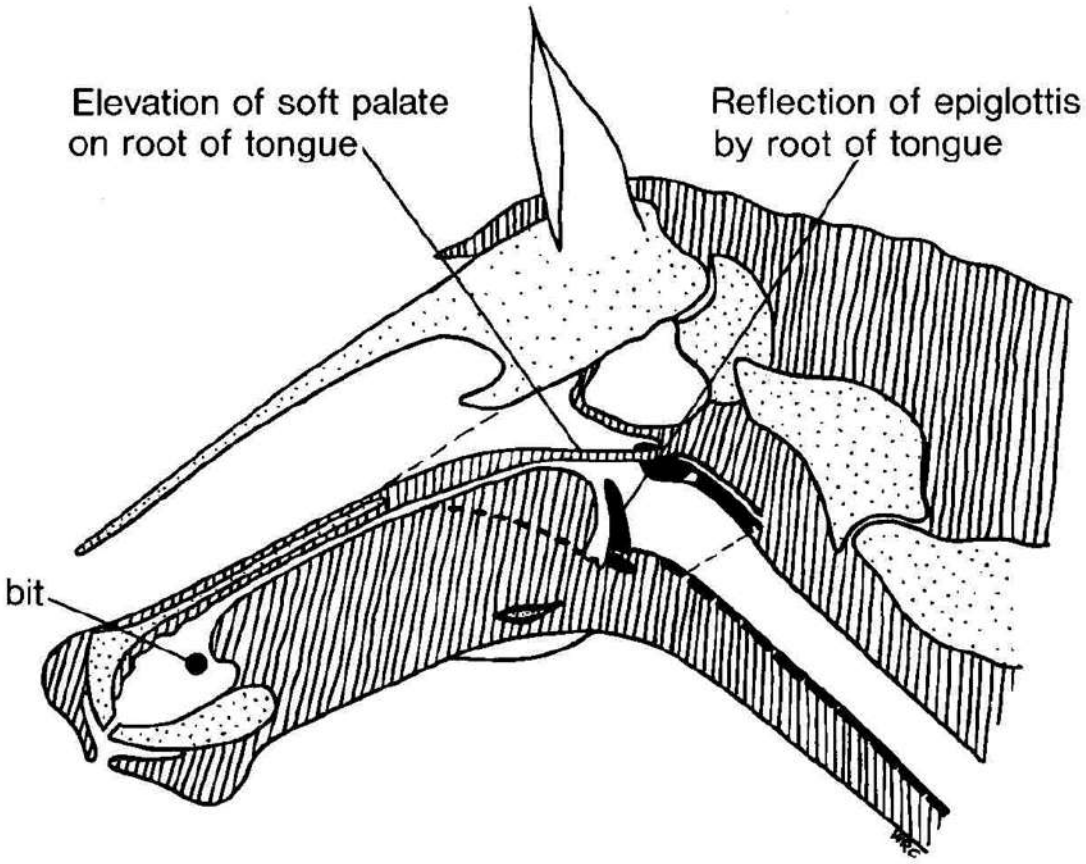


Figure 30. Together, the three steps described below for breathing deeply and rapidly at the gallop, stabilize the throat airway and prevent the obstruction of the airway as here depicted, with the soft palate billowing up like a blanket in the breeze at each intake of air.

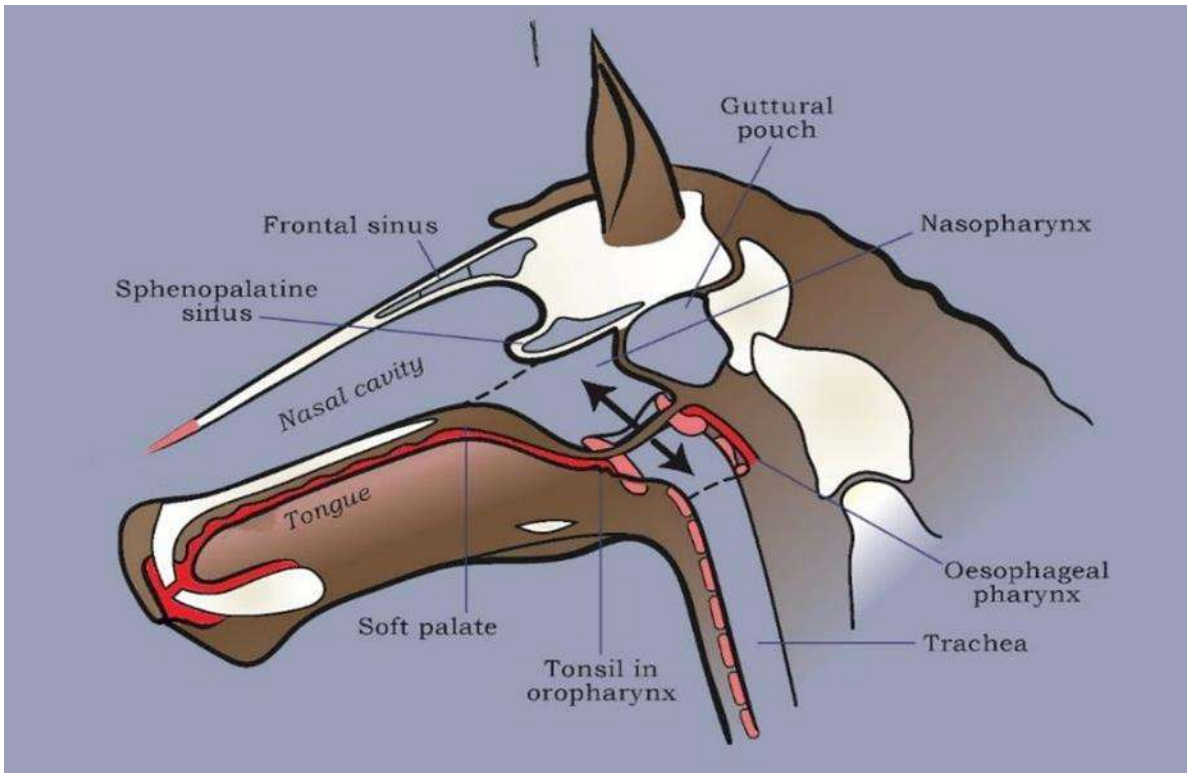


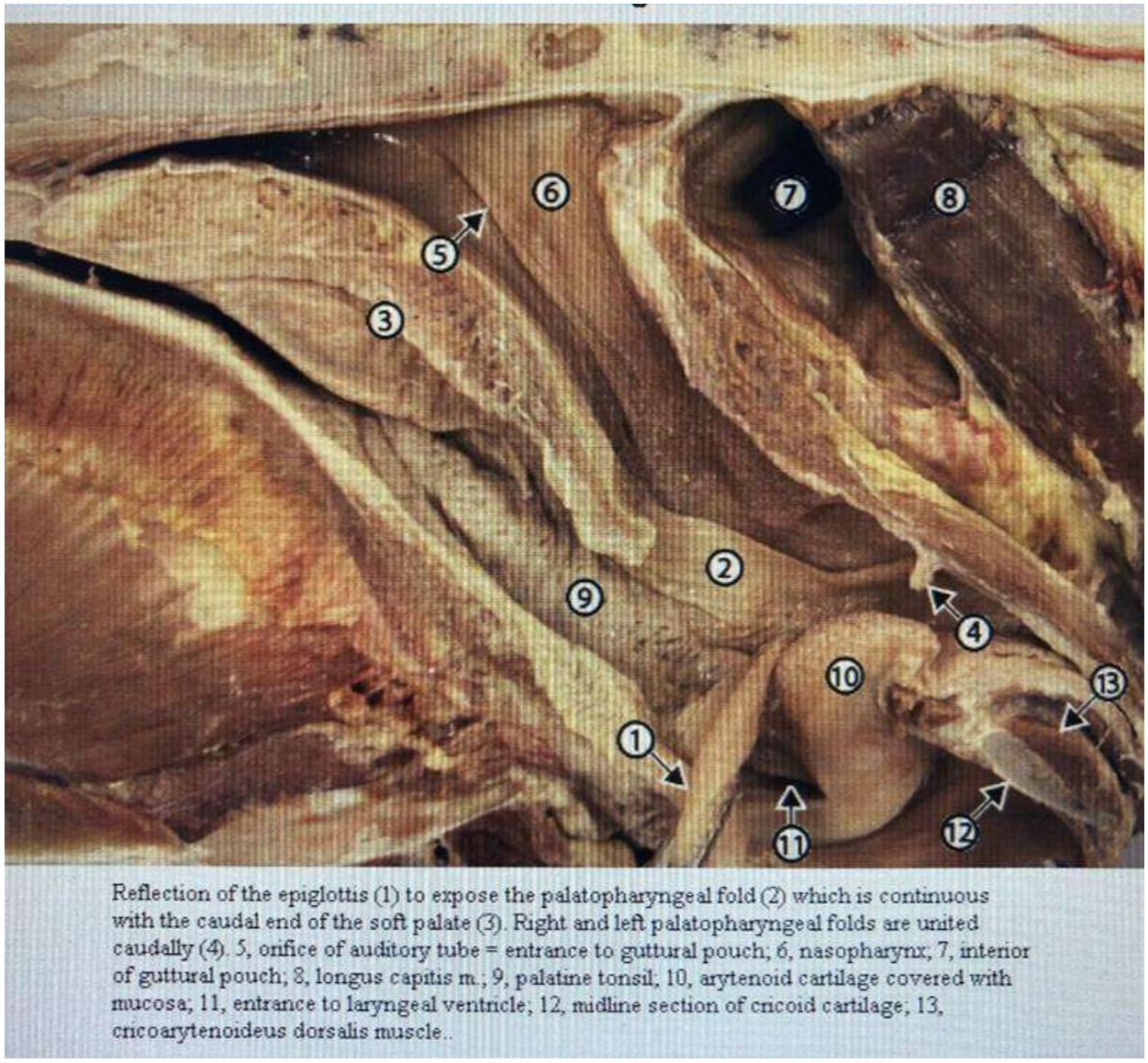
Figure 31. Bit-free and airway unobstructed for fast exercise. The respiratory pathway is fully operational, as it should be, at the expense of the digestive pathway. This is the configuration of all the moving parts that an exercising horse needs. The previous diagrams were necessary so that the reader can understand that a bit stimulates the digestive system of a horse as for eating (including salivating and swallowing) conflicting with what should be a breathing priority at exercise.

1.The head and neck are extended, and the lips are sealed. There is no air in the oral cavity. The red color indicates the negative atmospheric pressure in the oral cavity and esophagus that is essential for maintaining an unobstructed airway.

2. The soft palate is adherent to the root of the tongue and securely 'buttoned-up' around the laryngeal 'button'.

3. Poll extension at fast exercise stretches the soft-walled throat airway longitudinally, providing a 'tautness' that resists the negative pressure forces of inspiration that would otherwise result in dynamic collapse of the airway.

Key: white = bone; brown = soft tissue; pink = cartilage; red = digestive tract compartments (oral cavity, oropharynx, and esophageal pharynx).



Reflection of the epiglottis (1) to expose the palatopharyngeal fold (2) which is continuous with the caudal end of the soft palate (3). Right and left palatopharyngeal folds are united caudally (4). 5, orifice of auditory tube = entrance to guttural pouch; 6, nasopharynx; 7, interior of guttural pouch; 8, longus capitis m.; 9, palatine tonsil; 10, arytenoid cartilage covered with mucosa; 11, entrance to laryngeal ventricle; 12, midline section of cricoid cartilage; 13, cricoarytenoideus dorsalis muscle..

Figure 32. Note how the marker for number 1 is superimposed on the membranous top surface of the tongue at the tail-end of the tongue's 'root' and how the membrane is thickened at this section, illustrating what is described in anatomical texts as the tongue root's 'dorsal fibrous cord.' This is, I believe, the equine equivalent of the 'torus linguae' of the rabbit, also a nose-breathing animal. The 'torus' of the rabbit and the 'cord' of the horse serve I believe as a 'platform' on which the soft palate is secured in air-tight apposition with the root of the tongue when these animals run.

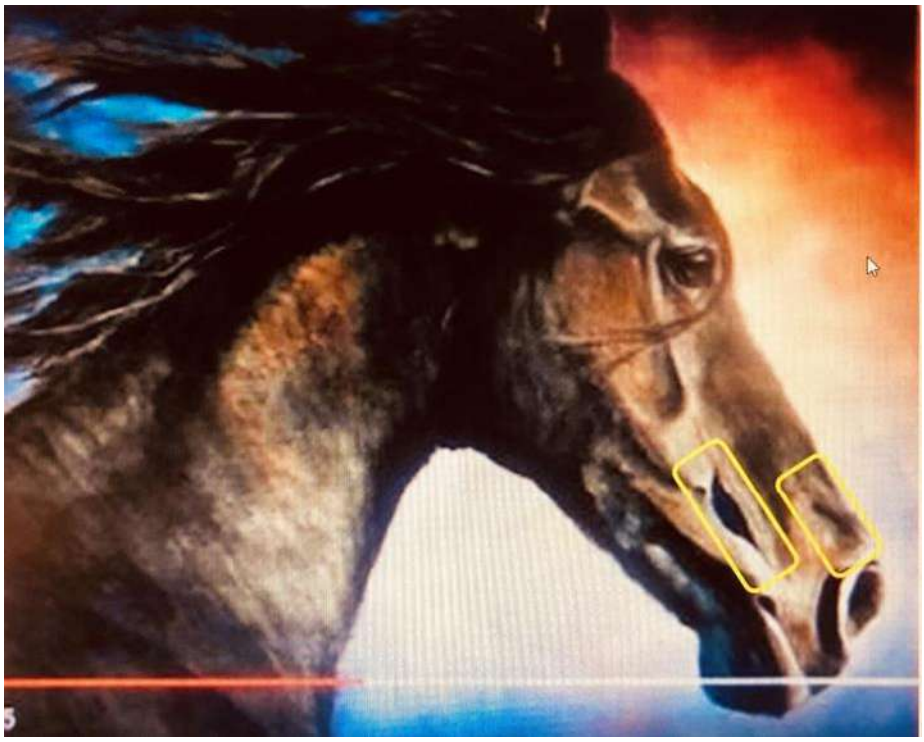


Figure 33. Sealed lips and a dimple in the cheek of a horse running at liberty; visual evidence of a negative atmospheric pressure in the oral cavity at exercise. The dimple is within the larger of the two grids - the dark shadow starting just behind and slightly above the corners of the mouth. Its straight edge illustrates how the vacuum in the oral cavity causes the cheek to be sucked-in against the roof of the mouth at the level of the 'bars' of the mouth. The smaller grid illustrates a slight nasal dimple from collapse of the false nostril during inspiration.
[Photo with grids added courtesy of Dr. Paul McGreevy]

Figure 34. Showing the dimple when a horse drinks and uses a negative pressure in its oral cavity to suck water into its mouth.

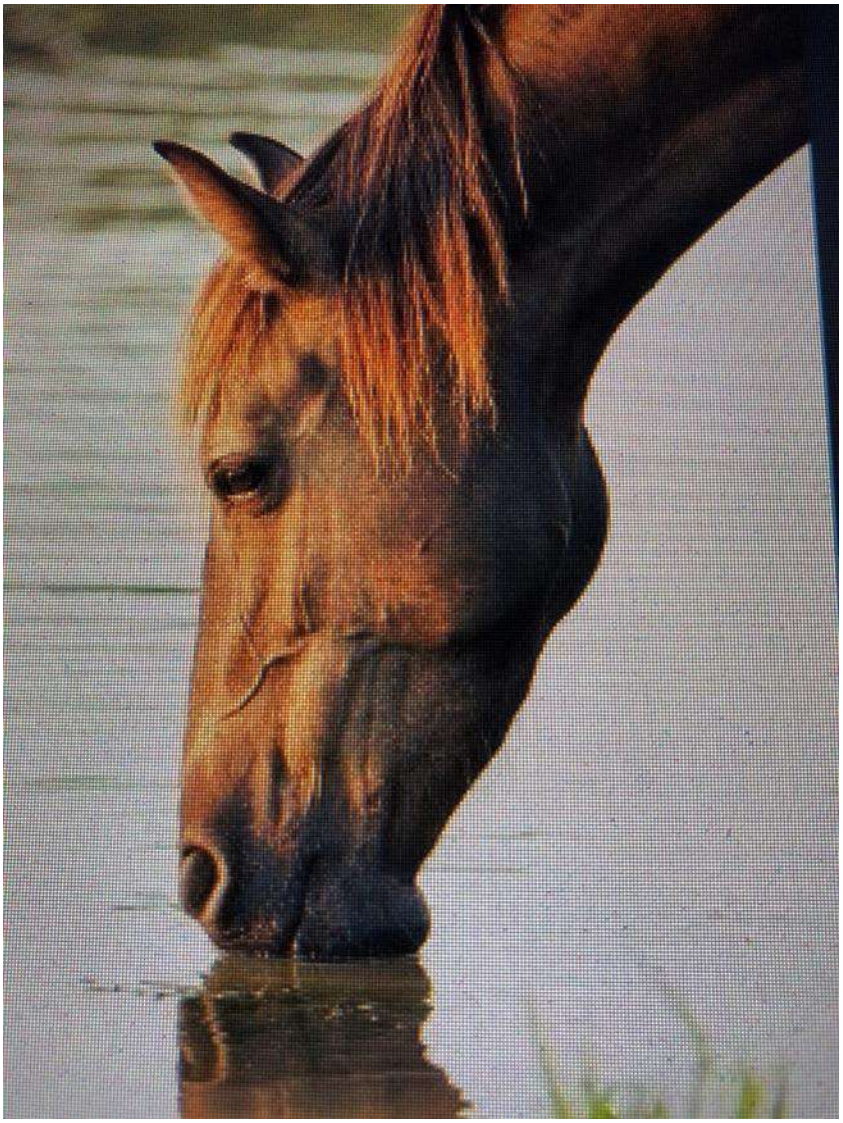


Figure 35. Another dimple.

An incomplete list of bit-induced diseases

- Suffocation: One or more bits and sometimes a tongue-tie breaks the lip seal, dissipates the vacuum pressure, and untethers the soft palate. Hence an ensuing cascade of suffocation occurs. Horses are nose-breathers. They cannot mouth-breathe because of their long soft palates. In the wild, they run with sealed lips and a sub-atmospheric pressure in the oral cavity that keeps the soft palate firmly clamped to the root of an immobile tongue and snugly buttoned-up around the entrance to the larynx. Together with poll extension, this provides a throat airway that is unobstructed; a tracheal airway that during inhalation at the gallop does not dynamically collapse; and healthy lungs to energize the horse's primary means of defense – flight. A bit breaks the lip seal; dissipates the oral cavity's negative pressure; unfastens the soft palate from the tongue; loosens and sometimes unbuttons and displaces it from the larynx; obstructs the throat airway; and triggers dynamic collapse at multiple sections of the cervical windpipe. Poisseuille's law

of aerodynamics determines that the respiratory tract downstream from the throat and the lungs, will - at every inhalation - be subjected to increasingly powerful suction forces (barotrauma) as distance from the throat increases. Accordingly, the most severe dynamic collapse in the windpipe occurs at the base of the neck. In time, succeeding episodes of suffocation during training and racing permanently deforms tracheal cartilage and irreversibly damages bruised and bleeding lungs. The consequent 'scabbard trachea' changes provide tangible 'cause-of-death' evidence. In the chest, the delicate air sacs of the lungs are bruised at every impeded breath and quickly change from their normal, lace-like texture of 'dry, light and fluffy' to the 'soggy pudding' of negative pressure pulmonary edema (NPPE)[3]. As a galloping horse takes just over two deep breaths a second, this explains how suffocation-induced 'waterlogging' of the lungs can lead rapidly to a cascade of breathlessness, fatigue, falls, fractures, dislocations, and death.

- Regrettably, the bit is commonly used, counter-productively, to flex a horse at the poll, adding to airway obstruction.

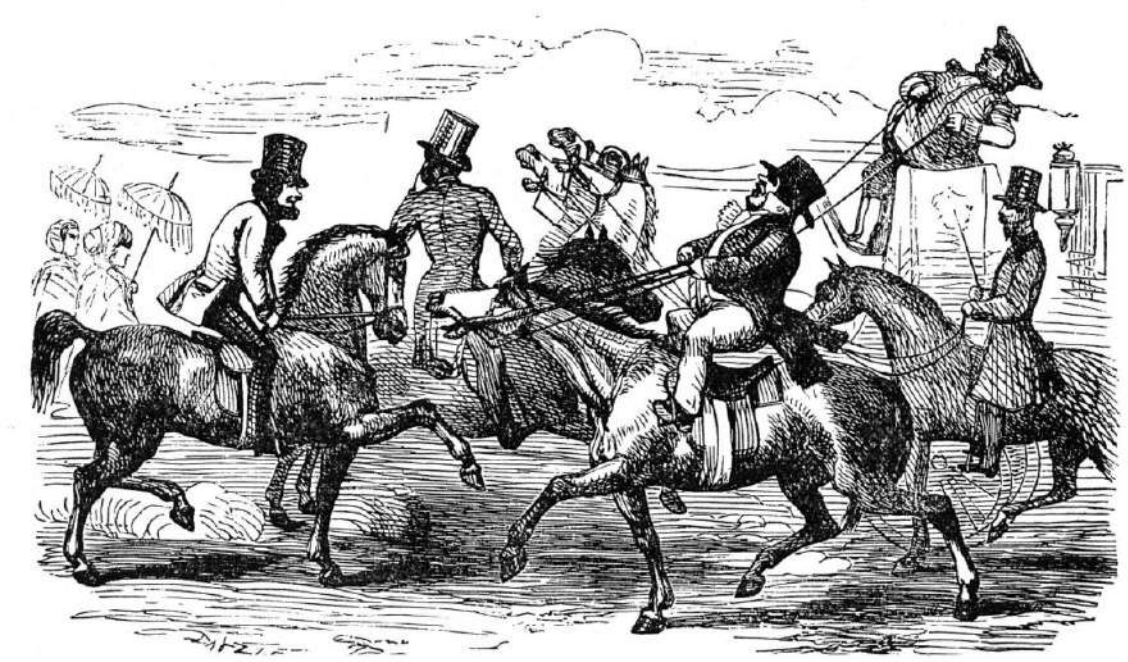


Figure 36. *Edward Mayhew's 1890 illustration carried the caption, "Various modes of forming that which all men speak of with admiration, as '*a good mouth.*'*

Figure 37. Three common headsets as illustrated by drawings taken from action photographs of (from top to bottom) a racehorse, show jumper and dressage horse. As poll flexion increases, airway obstruction increases logarithmically.

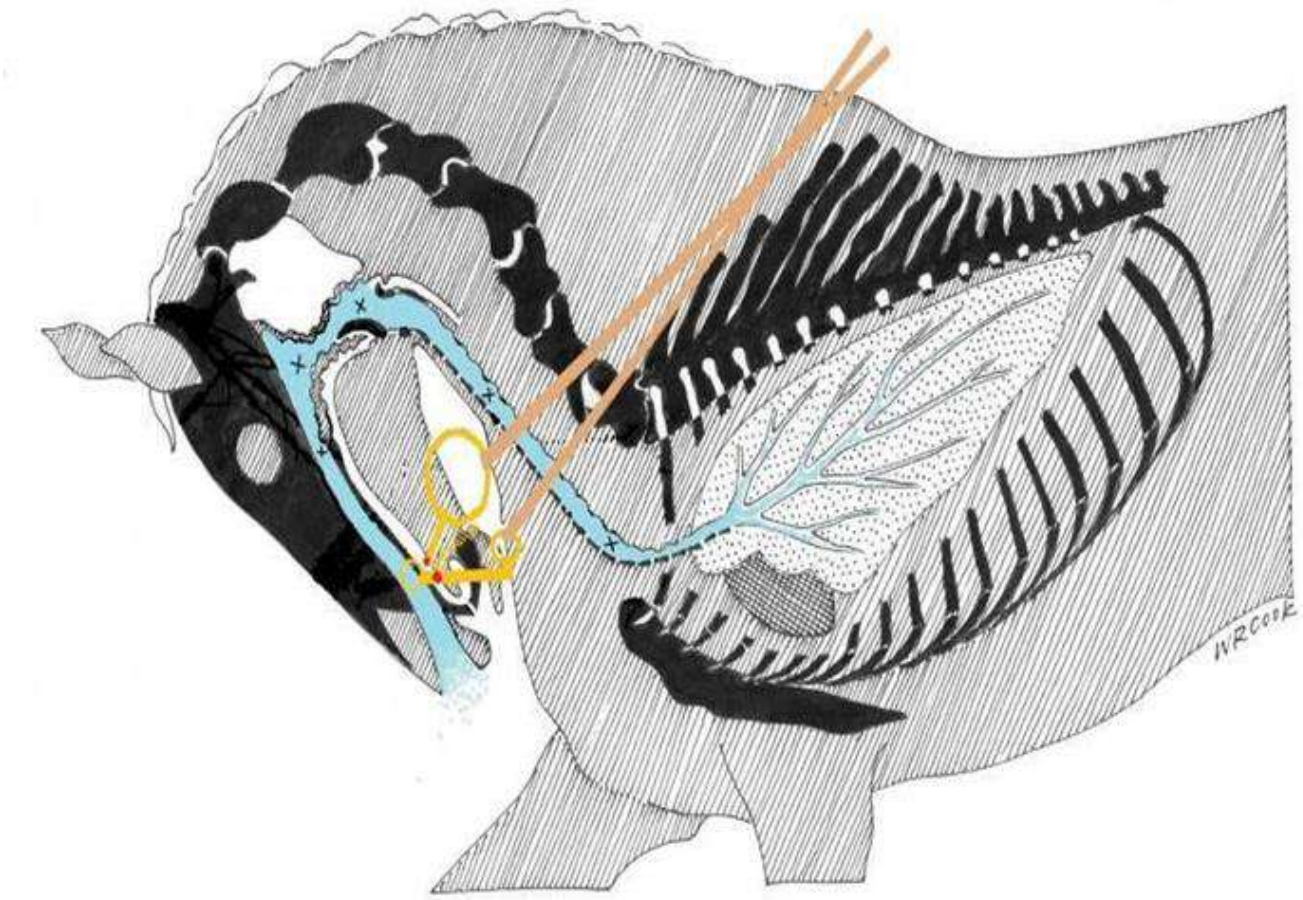
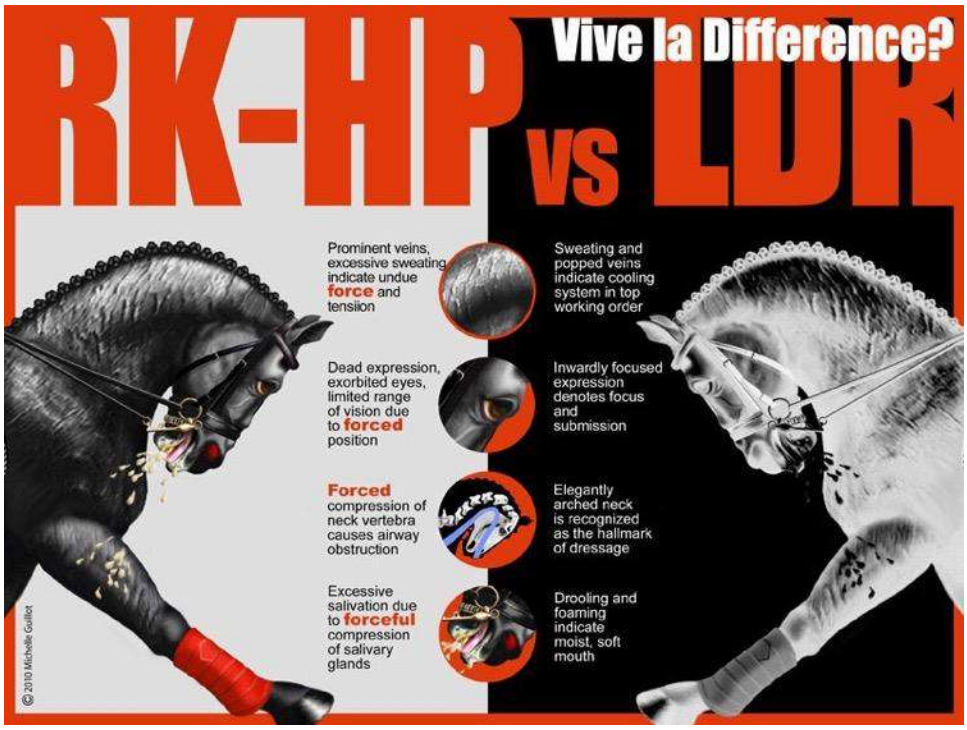


Figure 38. Showing how the practice of overbending, apart from causing intense pain, handicapping vision, locomotion, and balance, also causes increasingly dynamic obstruction of the airway at each of the points marked 'x.' The severest obstruction occurs at the base of the neck. The infinitely delicate tissues of the lungs are bruised with each intake of air. As horses when running take one breath for every stride, even at a moderate canter the lungs are bruised by barometric negative pressure damage ('hickeys') at the rate of twice a second. In the bit-ridden racehorse, with unsealed lips, suction pressure at each obstructed breath quickly causes negative pressure pulmonary edema (waterlogging of the lung), the so-called exercise-induced pulmonary hemorrhage ('bleeding'), and other consequences such as premature exhaustion, falls, catastrophic injuries, and sudden death.



Michelle Guillot's satire on the FEI ruling that Rollkur (RK) was banned and that Low Deep and Round (LDR) was acceptable.

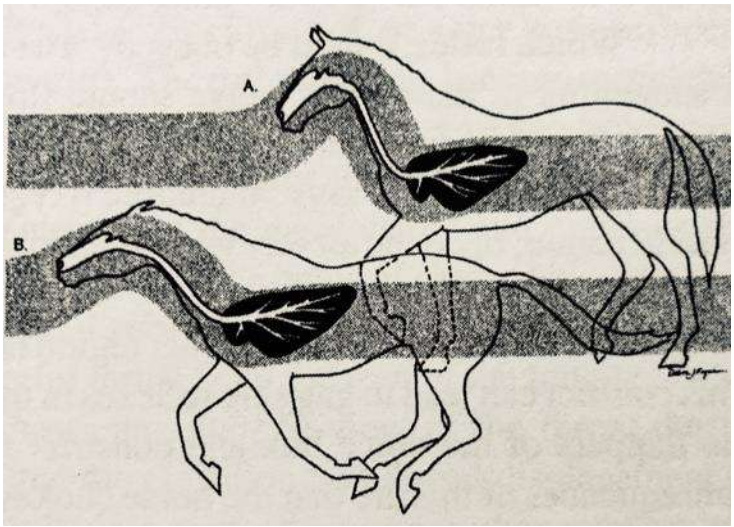


Figure 39. Airflow at the walk (A) and gallop (B) when unrestricted by bit-induced flexion. At liberty, a horse gallops with its head and neck extended, like a swan in flight.

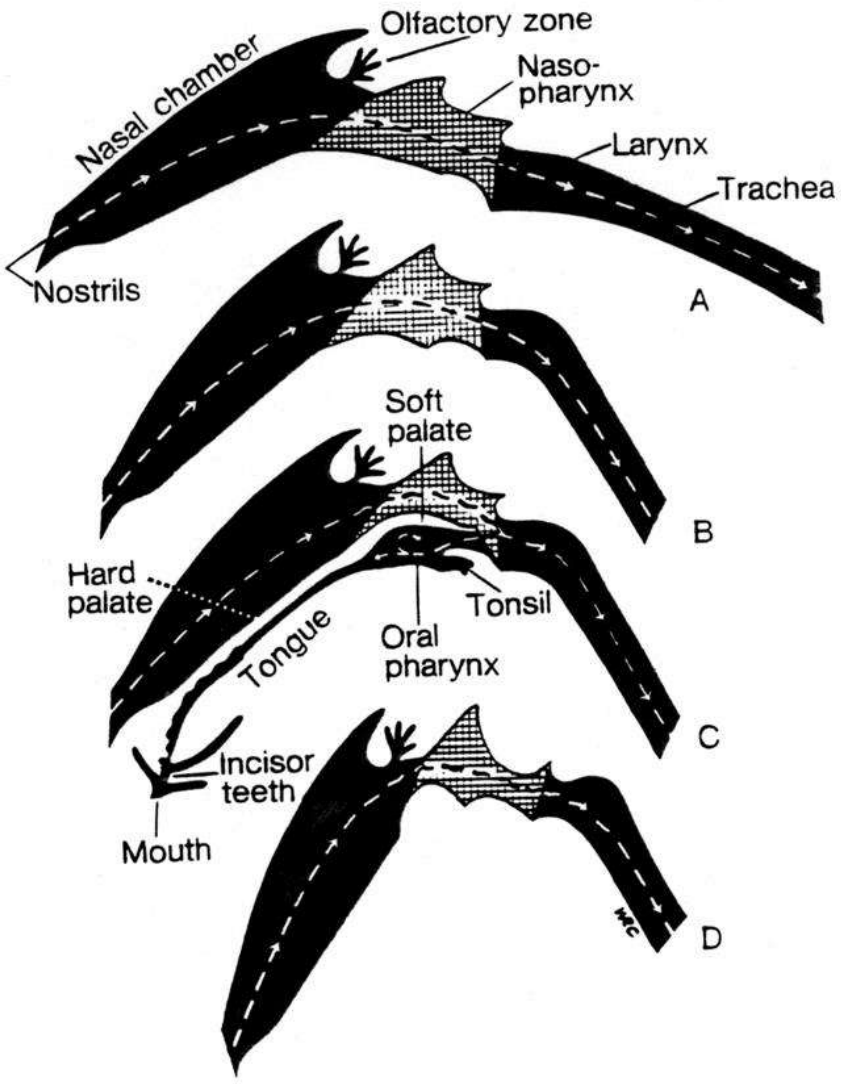


Figure 40. Diagrams based on x-rays of a horse's head and neck in full extension (A) and various degrees of poll flexion (B-D), showing how different degrees of bit-induced poll flexion, and dorsal displacement of the soft palate as in C, result in airway obstruction at the throat – the cross-hatched area. From A-D the percentage sectional areas of the throat as seen on this lateral view are 100, 90, 43 and 53%.

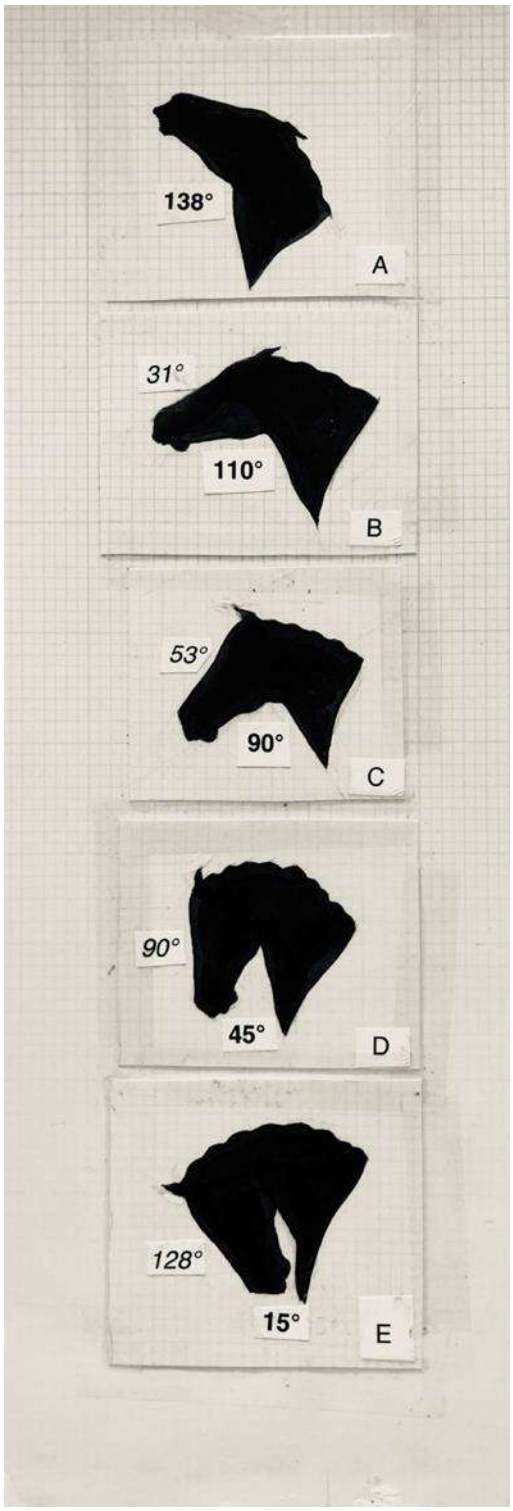


Figure 41. Jowl angles from full extension to full flexion (‘overbent’)

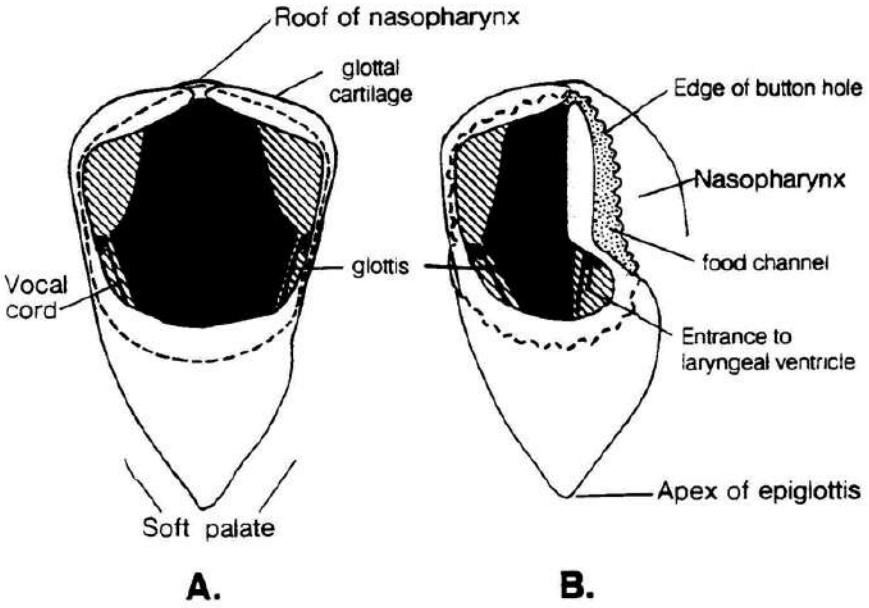


Figure 42. Endoscopic view of a healthy, fully dilated voice box at exercise compared with that of a horse with left-sided recurrent laryngeal neuropathy (a 'roarer'). The broken lines indicate the location of the soft palate buttonhole; stretched to embrace the voice box and make an airtight seal in A; relaxed in B and endoscopically visible on the paralyzed left side.

Continuing with the bulleted list of bit-induced diseases ...

- Lip sores
- Mouth ulcers
- Bruising and laceration of the tongue
- Cyanosis of the tongue
- Dental erosion
- Periodontal disease
- Tooth fractures: pain, infection, poor performance etc.,
- Entire loss of the first lower cheek tooth
- Bone spur formation on the bars of the mouth; a daily repeated cause of pain in the bit-ridden horse
- Pain from the bit applying pressure on an unerupted wolf tooth in the lower jaw, immediately in front of the first cheek tooth (Fig. 2).
- Toothache: From the many bit-induced dental diseases already illustrated above, it can be assumed that bit-induced toothache in the horse is common, though listed under different names and categories, e.g., headshaking, sore mouth, inappetence, head tilt, bit-lameness etc., Canine teeth in geldings do not erupt until a horse is five. Male horses of racing age are sensitive in the mouth because of the presence of the developing roots of both canine teeth.
- Jawbone infection

*Figure 43. In this specimen, bit damage has caused bone infection (*osteomyelitis*) of the bars of the mouth and a portion of dead bone (a* sequestrum*) has been shed.*

Figure 44. Two views of the same jaw specimen from different angles, showing (particularly clearly in the top photo) bit damage to the bars of the mouth at a point immediately above the mental foramen (a sequestrum has been shed), also bone spurs on the right side. The bottom photo shows bit-induced erosion of enamel of both canine teeth. Bone spurs are most apparent on the left side.

(American Natural History Museum)

- Fractures of the jawbone
- Trigeminal neuralgia (headshaking)
- Bit-lameness: Subtle lameness's and gait abnormalities caused by bit pain, for which a dressage rider may unfairly blame the horse.
- Soft palate instability
- Dorsal displacement of the soft palate (‘choking up’)
- Epiglottal entrapment: A deformity of the epiglottis (a laryngeal cartilage) brought about by bit-induced airway obstruction of the throat (see diagram below).

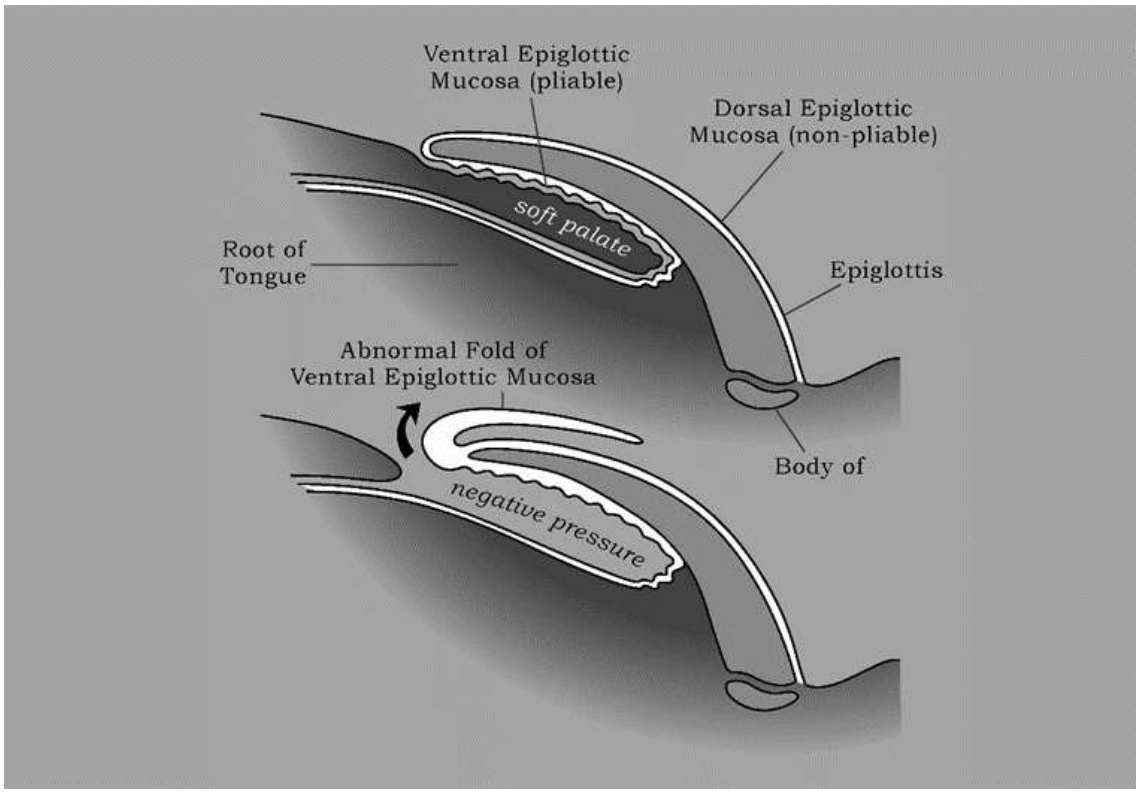


Figure 45. Close up diagrammatic view of epiglottal entrapment.

The top diagram shows the normal approximation of the soft palate to the underside of the epiglottis above and the root of the tongue below in a horse at liberty when running. The approximation is slightly 'exploded' in the diagram for the purpose of clarity, but the complete absence of an air space in reality ensures that the loosely attached mucous membrane on the underside of the epiglottis is not exposed to the suction pressure of inspiration.

The bottom diagram shows what happens when bit usage dissipates the oral cavity negative pressure. The buttonhole of the soft palate has been displaced and is no longer embracing the voice box. As a result, the negative pressure of inspiration has drawn a fold of epiglottal mucous membrane in the direction of the lungs, 'hooding' the epiglottis. At each inspiration, the untethered soft palate now elevates at each breath, seriously obstructing the throat airway.

- Exercise-induced dynamic collapse of several portions of the voice box (aryepiglottic folds, arytenoid cartilage - especially the left cartilage).
- Exercise-induced dynamic collapse of the windpipe in the neck (leading to permanent 'scabbard trachea' deformities). A defect currently being overlooked at the mandated autopsy examinations for cases of sudden death.
- Exercise-induced pulmonary hemorrhage, 'bleeding.' A better name for this regrettably universal disease of the racehorse is the name for an occasional anesthetic emergency in human medicine, also caused by airway obstruction - negative pressure pulmonary edema ('waterlogging of the lung'). An internet search will provide further understanding of the similarity of these two problems. In man, negative pressure pulmonary edema causes

intense chest pain and a sense of drowning. It is likely that the horse experiences similar feelings of fear, pain and panic.

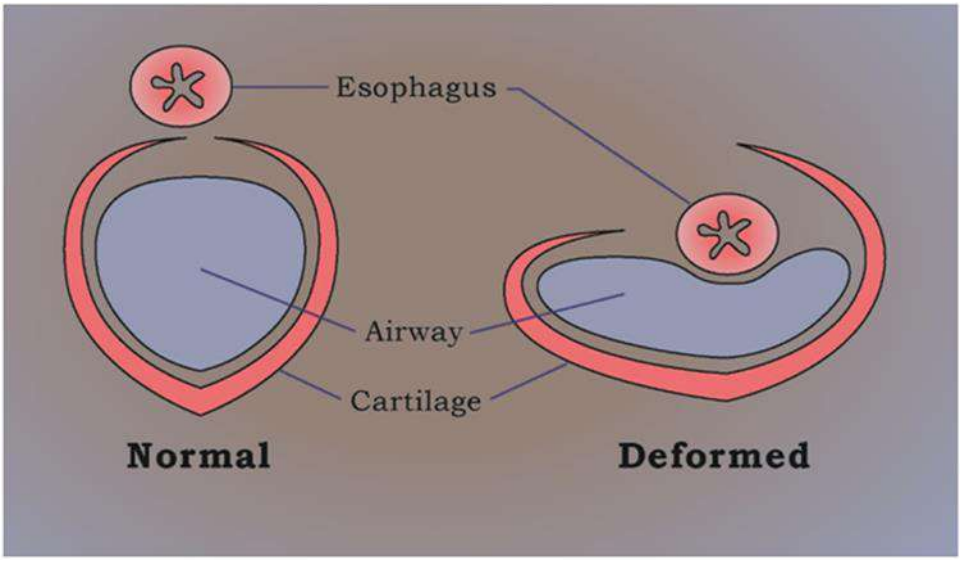


Figure 47. Bit-induced 'scabbard'-deformity of the cervical trachea. Post-mortem changes such as hypostatic congestion of the lung can mask evidence of bit-induced 'waterlogging' (edema) and make interpretation difficult at autopsy. Tracheal lesions, on the other hand, are not affected by post-mortem change and constitute unequivocal autopsy evidence of suffocation

- Fractures and dislocations: A racehorse's limb bones may incur a fracture due to concussive forces when a forelimb becomes weight-bearing. Consequently, the horse then falls. Such a sequence of events is considered especially likely if pre-existing microfractures of the limb were present. A sequence of events that has received less attention is that a horse may incur fractures and dislocations due to falling at speed, when the fall itself was caused by pre-existing, bit-induced pain, suffocation, and fatigue. It is proposed that a combination of pain, suffocation and cardiac arrest explains the cause of 'bleeding,' catastrophic accidents and sudden death.
- 'Scabbard trachea' deformity. The diagram below shows a normal cartilage and airway at the top of the neck and a deformed cartilage and airway at the base of the neck. Because the roof of the airway in the deformed cartilage lacks the support and rigidity normally supplied by cartilage, the soft tissue membranous lining of the trachea will - at each intake of air - incur dynamic collapse and cause further airway obstruction in a galloping horse, breathing deeply and rapidly.

Figure 48. 'Scabbard' trachea deformities from a Thoroughbred racehorse: Showing from left to right, transverse serial sections through the cricoid cartilage of the voice box (a complete 'ring') and the C-shaped cartilages of tracheal rings at regular intervals to the base of the neck. The series is a pictorial expression of a law of aerodynamics (Poiseuille's) that explains why the negative pressure of airflow becomes increasingly more powerful as distance from the source of an obstruction increases. In this case, repeated episodes of bit-induced airway obstruction will have occurred at the level of the throat to cause the deformity at the base of the neck.

- Dynamic collapse of the windpipe in the neck (leading to permanent 'scabbard trachea' deformities). A defect currently being overlooked at autopsy examinations for cases of sudden death.

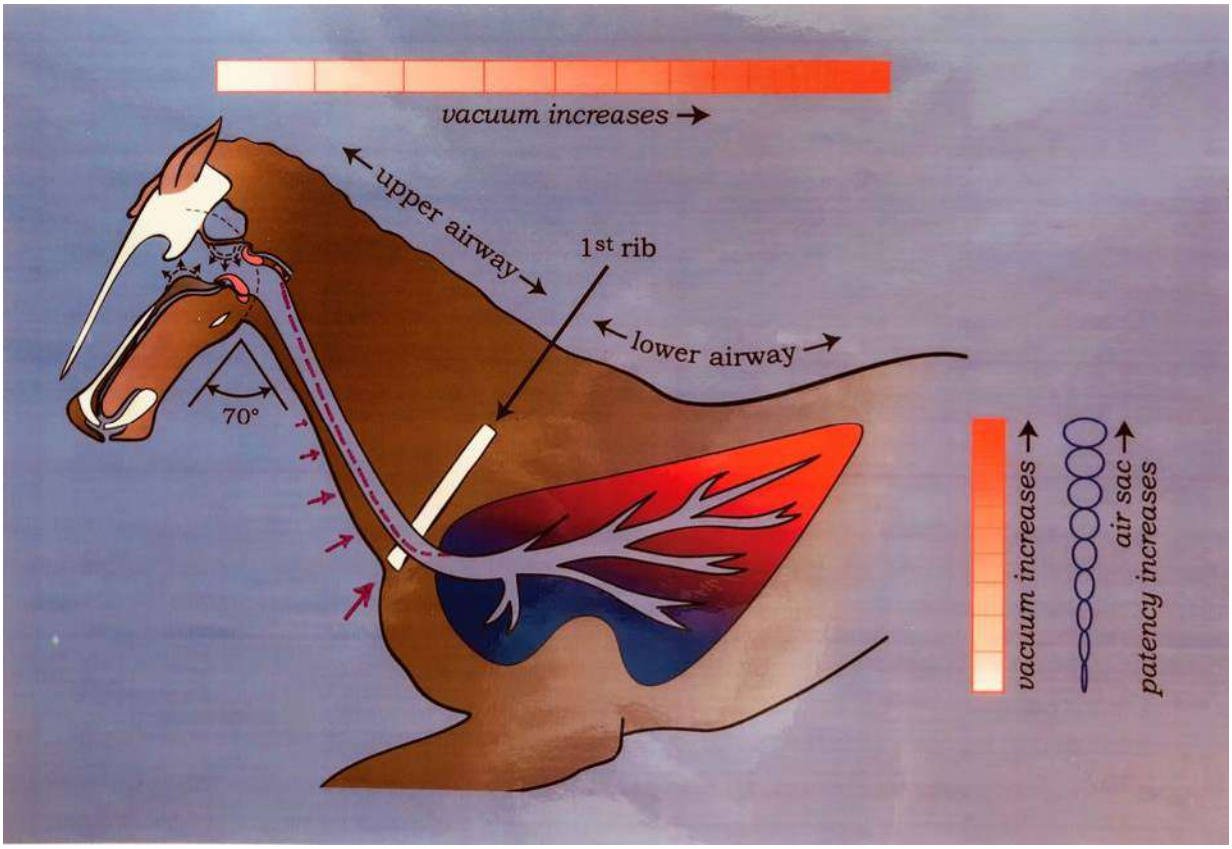


Figure 49. The mechanism whereby bit-induced obstruction of the throat airway causes, in turn, increasingly severe dynamic collapse of the windpipe (as judged by the broken line and red arrows) and barometric bruising of the lung at each intake of air, i.e., negative pressure pulmonary edema ('waterlogging' of the lung and 'bleeding').

- 'Waterlogging' of the lung and 'bleeding.' This scourge of the racehorse, all too familiar under the name 'exercise-induced pulmonary hemorrhage' and the acronym EIPH, is analogous to a well-documented emergency in human medicine caused by airway obstruction - negative pressure pulmonary edema. An internet search will provide more information. In man, this 'waterlogging' of the lung can be accompanied by acute chest pain, fear, and a sense of drowning. A horse may experience similar feelings.
- Exercise-induced hypoxemia (low blood oxygen) as a sequel to bit-induced lung damage leading to poor performance, premature exhaustion, stumbling, falls, catastrophic injuries and sudden death. Hypoxemia has long been recognized as a condition of the Thoroughbred racehorse. It is one of many common respiratory conditions that are categorized as of unknown cause, e.g., palatal instability, recurrent laryngeal neuropathy, 'bleeding.' I predict that all of these may be bit-induced diseases, but this idea cannot be tested until bit-free racing is allowed and it is found that these problems no longer occur.
- Recurrent laryngeal neuropathy: Hypoxic neuropathies are well documented in human medicine. In the horse, the long axon of the left recurrent laryngeal nerve, the function of which is critical to full dilation of the larynx at exercise, is especially vulnerable to such damage. Left-sided partial laryngeal paralysis is extremely common in the bit-ridden

Thoroughbred and complete left-sided paralysis also occurs, though less frequently. It is conceivable that both degrees of recurrent laryngeal neuropathy are caused by bit-induced hypoxemia.

- Asthma (previously known as 'broken wind', 'heaves', chronic bronchitis, and 'small airway disease'): This common lung disease of the horse, long associated with air pollution from stable dust may also, I believe, be contributed to by repeated episodes of lung damage caused by bit-induced airway obstruction at exercise. Until the use of the bit becomes a relic of the past and horses are no longer kept in small dusty boxes, we will not know for sure. It may not be a coincidence that so many longstanding and common respiratory diseases of the horse have been and still are categorized as 'idiopathic', I.e., as diseases of unknown cause.
- Cardiac arrest: Bit-induced stimulation of a trigeminocardiac reflex in the horse could be another cause of cardiac arrest and sudden death (Cook 2021). The possibility awaits testing by bit-free racing.

Clinical signs of bit-induced pain and so-called 'abnormal' behavior

The horse's many aversions to the bit are physiological responses and examples of non-acceptance of the bit as explained at the top of the article. Use of a bit automatically triggers a horse to express a large repertoire of conflict behaviors which, in turn, result in a rider's loss of control and accidents to horse and rider. Bit usage is both physiologically contraindicated and counterproductive. These so-called conflict behaviors in response to pain and other discomforts are entirely physiological behaviors, normal to the species. They may be 'inconvenient' for the rider, but they are not, in themselves, abnormal behaviors. It is the condition causing them that is abnormal. Horses should not be blamed for reacting to pain caused by the rider. A horse that does not react to pain is a neurologically abnormal horse suffering from 'learned helplessness,' a condition I believe to be akin in the horse to post-traumatic stress disorder in man.

Figure 50. The word 'homunculus' (Latin for 'little man') has a history dating back to alchemy in the 16th century and the concept of human sperm containing a 'little man' that developed in the uterus. Today, in human neurology, the homunculus refers to a teaching model for visually portraying a nerve map of the brain. The model demonstrates, using anatomical emphasis, the relative amounts of 'real estate' that the human brain invests in innervating different parts of the body. Hence the model of the brain is 'all hands', reflecting our innate tendency to explore with our hands (sensory power) and to hold (motor power) – sometimes referred to as our Simian-grasping instinct.

[image retrieved at https://img.etsystatic.com/il/b1c0b6/1281989377/il_fullxfull.1281989377_8wcn.jpg]

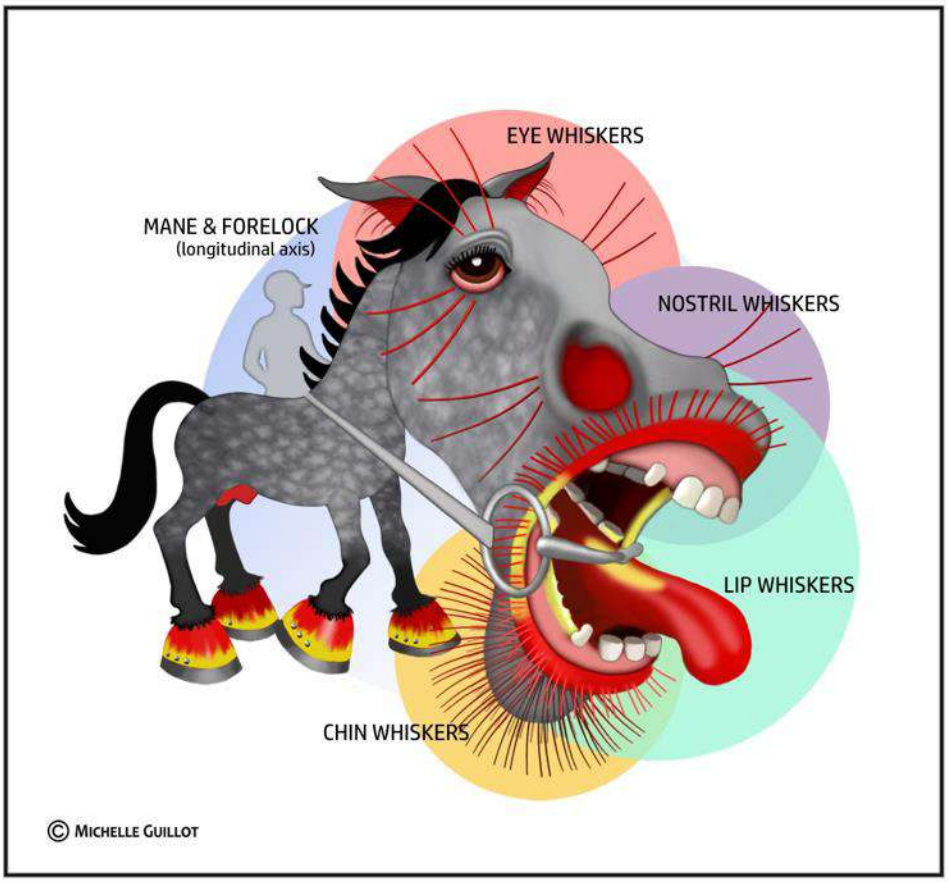


Figure 51. The 'little horse's' silent scream - the horse equivalent of a homunculus *(With a nod to Edvard Munch's 1893 painting, 'The scream').*

The graphic illustrates the horse's neurological emphasis on the muzzle and mouth; supreme sensors for touch, temperature, and pain. Regions of normal hypersensitivity are colored red. For a bit-ridden (i.e., disabled) horse, particular sub-regions of these normally hypersensitive areas are colored yellow to indicate their pathological and extreme super sensitivity *when damaged by equipment (e.g., bits and shoes). In normality, a horse's whiskers provide the horse with an 'aura' of touch sensitivity that extends to the tip of its whiskers and to an unknown distance beyond. These 'antennae' have the capacity to detect the subtle movement of air in the horse's personal space. We can assume that this aura will be especially active under those same conditions of bit-inflicted tissue damage that renders the mouth supersensitive. In the vernacular, this is the condition in which a horse is described, for good reason, as being 'touchy about the mouth.'*

[Image courtesy of Michelle Guillot]

Bit-induced conflict behaviors

Listed below in order of decreasing frequency are the 67 signs tested for in a questionnaire study (Cook and Kibler 2018). As a mnemonic they can be largely grouped as 'the five F's' of fear, flight, fight, freeze and facial neuralgia and their origins traced back to stimulation of the FIFTH cranial nerve, the trigeminal. This is the only data on this topic ever to be collected.

Table 1. *Prevalence of 68 pain indices in 66 horses, when ridden with and without a bit, listed in decreasing order of prevalence.*
The mean reduction when bit-free was 85% (range 43–100) with a median of 87%.
Many of the bit-induced pain indices jeopardized the safety of both horse and rider.

Order when bitted	PAIN INDICES	Number of horses affected BITTED	number of horses affected BIT-FREE	Reduction when bit-free (%)	Inferred likelihood of horse having POSITIVE AFFECTIVE EXPERIENCES e.g., pleasures of safety, confidence, comfort, compliance, enthusiasm, motivation following removal of the bit and cessation or easement of pain
1	Hates the bit	53	0	100	The relief, pleasure and comfort of being without pain
2	**FRIGHT:**	46	4	87	One of the five major categories of fear (the five 'F's), replaced by calmness, ease and comfort
3	Stiff-necked	45	7	84	Freedom of the head: Ability to balance; smoothness and fluidity in the 'way of going'
4	Lack of control	43	6	86	Horse/rider high accident hazard replaced by willing cooperation, harmony and partnership
5=	Resents bridling	41	3	93	Drops head eagerly into bridle; exhibits enthusiasm for work
5=	Above the bit	41	3	93	Able to select the physiologically most comfortable (optimally balanced) head position
6	Muzzle rubbing	40	9	77	Relief from the persistent irritation and distraction of facial neuralgia
7=	Head shaking	37	8	78	As above for 'muzzle rubbing' - the relief from nerve ache

Order when bitted	PAIN INDICES	Number of horses affected BITTED	number of horses affected BIT-FREE	Reduction when bit-free (%)	Inferred likelihood of horse having POSITIVE AFFECTIVE EXPERIENCES e.g., pleasures of safety, confidence, comfort, compliance, enthusiasm, motivation following removal of the bit and cessation or easement of pain
7=	Unfocused	37	1	97	Focused; not distracted; 'listens' to and complies with rider's signals
8	**FLIGHT**	35	1	97	Contentment; energy conservation; no propensity to bolt, rush or run away
9=	**FIGHT**	34	2	94	Calm, quiet, cooperative and willingly offers compliance
9=	Pigrooting	34	2	94	See 'fight' above: Does not grab the bit and snatch reins from rider's hands
10	Difficult to steer	33	8	76	Ability to balance; steers straight and turns comfortably (also see 'lack of control' above)
11=	Stiff or choppy stride	32	2	94	Enjoys the natural rhythm of motion (also see 'stiff-necked' above)
11=	Reluctant to rein-back	32	10	69	Return of normal agility; one of many signs of reduced 'bit lameness'
12	Tail swishing	31	1	97	Removal of discomfort; tail movement in synchrony with spinal movement
13=	Hair-trigger response to bit	29	0	100	Calm and confident as opposed to 'highly strung,' anxious and apprehensive
13=	Sneezing & snorting	29	13	55	Restoration of normal breathing pattern; reduction of nasal irritation (facial neuralgia)
14	Yawning	28	4	86	Absence of yawning suggestive of reduced need to ease/interrupt pain signals (see facial neuralgia above)
15	Slow learner	27	1	96	Return of ability to learn - a vital survival strategy (see unfocussed above)
15	Uncooperative	27	3	89	See 'fight' above

Order when bitted	PAIN INDICES	Number of horses affected BITTED	number of horses affected BIT-FREE	Reduction when bit-free (%)	Inferred likelihood of horse having POSITIVE AFFECTIVE EXPERIENCES e.g., pleasures of safety, confidence, comfort, compliance, enthusiasm, motivation following removal of the bit and cessation or easement of pain
15	Heavy on the forehand	27	6	78	Unhampered ability to balance, return of normal agility, elimination of stress and pain
16	Fails to stand still	26	0	100	Return of species-specific default behavior of calmness and contentedness
17	Pulling on bit	26	0	100	No need to defend itself from the bit and become unbalanced in the process
18=	Grazing on the fly at exercise	25	11	56	Less need to ‘interrupt’ pain signals (see ‘yawning’ above)
18=	Inverted frame	25	5	80	No pain - no high head carriage - return of ability to balance
19=	Dislikes wind/rain/sunlight	24	10	58	Relief from trigeminal hypersensitivity
19=	Tilts head at exercise	24	5	79	Proper balance with no need to try and avoid bit pain
19=	Fails to maintain trot or canter	24	4	83	Engaged, lively, energized, exhibits vitality of fitness
20=	Difficult to mount	23	3	87	Reduced anxiety and apprehension
20=	Grabs the bit	23	0	100	No need for defensive behavior at exercise
20=	Lacks courage	23	5	78	Confident, engaged, and curious about its environment
21=	Napping	22	4	82	Reduction of fear; reduced pain increases comfort (see ‘Freeze’)
21=	Stumbling	22	7	68	Reduction of ‘bit lameness’ with unfettered proprioception enabling a horse to keep itself upright and safe

Order when bitted	PAIN INDICES	Number of horses affected BITTED	number of horses affected BIT-FREE	Reduction when bit-free (%)	Inferred likelihood of horse having POSITIVE AFFECTIVE EXPERIENCES e.g., pleasures of safety, confidence, comfort, compliance, enthusiasm, motivation following removal of the bit and cessation or easement of pain
22=	**FREEZE**	21	4	81	Keen to explore. Relief from the 'frozen' state of a prey animal when attacked by a predator
22=	Resents unbridling	21	1	95	Optimism rather than pessimism (see 'hates the bit' above)
22=	Behind the bit	21	1	95	Adopts head position based on proprioceptive signals (see 'above the bit')
22=	Head shyness	21	12	43	Abatement of trigeminal hypersensitivity, hyperalgesia or neuralgia
22=	Salivates excessively	21	2	90	A relatively dry mouth betokens contentedness at exercise
23=	Bucking or bounding	20	3	85	Less pain, more comfort
23=	Lazy or dull	20	4	80	Engaged aliveness
23=	Heads for the stable	20	6	70	Relishes exercise, fulfils biological drive and need for movement
23=	Jigging	20	1	95	Walks quietly and contentedly
24=	Unfriendly in stable	18	2	89	Return of normal (social) behavior
24=	Anxious eye	18	2	89	'Soft' (rounded) eye - an indicator of comfort
25=	Ear pinning at exercise	17	4	76	Non-aggression equates with the default social behaviour of the species
25=	Open mouth (gaping)	17	2	88	Closed mouth and sealed lips; oral vacuum restored; default condition for unobstructed airway at exercise

Order when bitted	PAIN INDICES	Number of horses affected BITTED	number of horses affected BIT-FREE	Reduction when bit-free (%)	Inferred likelihood of horse having POSITIVE AFFECTIVE EXPERIENCES e.g., pleasures of safety, confidence, comfort, compliance, enthusiasm, motivation following removal of the bit and cessation or easement of pain
25=	Lolling tongue	17	0	100	Another return to physiological and behavioural norm
25=	Reluctant to change lead	17	5	71	Return of normal agility with correction of ‘bit lameness’
26	Bites at tack or other horses	16	0	100	Reduced facial neuralgia enables disposition to move beyond neutral to a more positive emotional state
27	Scuffs hind hooves	15	7	53	Soundness of limb returns with correction of ‘bit lameness’
28	Backing-up	14	1	93	See ‘fails to stand still’
29	Multiple wrinkles around muzzle	13	2	85	Relaxation of tension with elimination of pain
30	Crossing the jaw	13	1	92	As above - return to ‘normal’ behavior when on the move
31=	Evades capture in paddock	12	2	83	Accepts rider as a member of its ‘herd’ or ‘band’
31=	Sweats excessively	12	1	92	No stress, less sweat
31=	Over bends	12	0	100	Proprioceptively and physiologically comfortable head position
31=	Tongue over bit	12	0	100	No need for defensive behavior following removal of the bit, unobstructed breathing
31=	Interfering	12	4	67	Another aspect of ‘bit lameness’ corrected
32	Rears	11	2	82	Reduction of bit-escape behavior

Order when bitted	PAIN INDICES	Number of horses affected BITTED	number of horses affected BIT-FREE	Reduction when bit-free (%)	Inferred likelihood of horse having POSITIVE AFFECTIVE EXPERIENCES e.g., pleasures of safety, confidence, comfort, compliance, enthusiasm, motivation following removal of the bit and cessation or easement of pain
33=	Runs wild on bitted lunge	10	1	90	More comfortable
33=	Lower lip slapping	10	3	70	More comfortable
33=	Incoordination.	10	1	90	Unhampered proprioception corrects ‘bit lameness’
34=	Eyes water	9	2	78	Reduction of corneal pain (facial neuralgia)
34=	Exercise triggers cough	9	2	78	Reduction of pharyngeal angina (trigeminal neuralgia) and/or inflammatory airway disease
34=	Back problems	9	2	78	Relief of ‘bit-lameness’
35	Retracts tongue behind bit	7	0	100	Return of default tongue position at exercise, oral vacuum, soft palate stability, unobstructed airway
36	Drops food	6	0	100	Elimination of ‘sore mouth’ (mandibular gingivitis)
37	Reluctant to drink during ‘endurance’ test	4	0	100	Ability to create an oral vacuum and relief of ‘sore mouth’ prevents dehydration

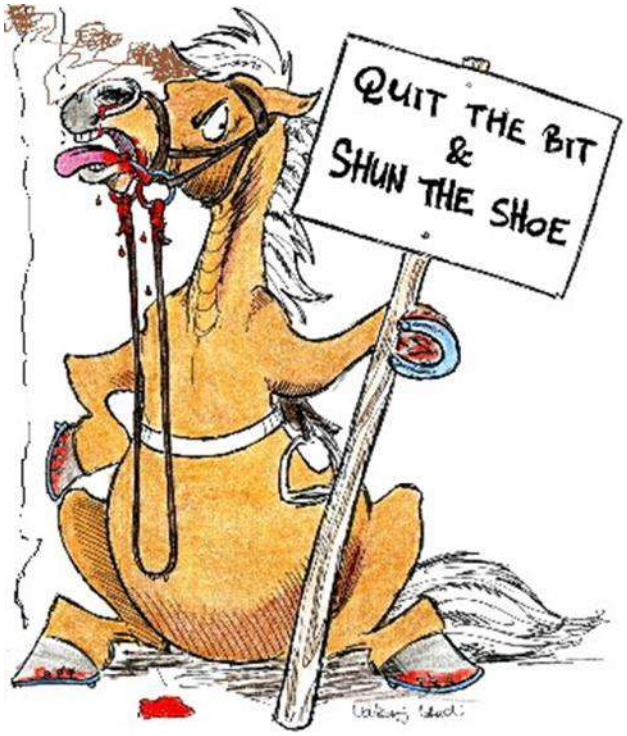
Figure 52. Horse Dashboard. When your horse develops any one of the 67 behaviors listed above, these warn of a problem that requires attention to avoid an accident.

[Graphic courtesy of Michelle Guillot]

Figure 53. Swedish Harness Horse being trialled in a crossunder bit-free bridle with a Y'-shaped connecting strap on each side linking the driver's lines to the horse's head. As the arm of the 'Y' that connected to the bit was longer than the arm that connected to the crossunders, no pressure could be exerted on the bit. Sadly, the Swedish Trotting Association ruled against this accessory being used in a race.

DISCUSSION

An open letter to the British Horse Society commented on the need for change (Glendell 2014). It included the observation that *"The presumption that horses should be bitted and shod with metal shoes persists, without any scientific justification."*



Since 2000, pioneering bit-free riders worldwide, in measureless numbers, have shown that bit-free riding is justified on ethical, safety and welfare grounds. During this time, even though horse riding is recognized as one of the most dangerous of sports and we are living in a litigious age, to my knowledge, not one legal suit has been filed attributing a horse-related accident to the horse being bit-free. Furthermore, during this period of increasingly intense debate, not one peer-reviewed paper has been published with evidence that refutes the welfare benefits for horses and riders of bit-free riding.

Many contributions to the debate have been made by researchers from all over the world. In this article, prompted by the recent report from the Danish Animal Ethics Council (2023), it is appropriate to list research from Denmark (Taylor 2022). In their statement, the Council reminds equine administrators in Denmark that if their equipment rules transgress the Danish Animal Welfare Act, the government has the authority *"to prohibit the use of coercive equipment and tack."* In how many other countries, I wonder, are equine administrations in similar jeopardy of being on the wrong side of the law?

Regardless of legality, for humanitarian reasons I recommend that equestrian sport administrators of all disciplines conduct bit-free trials and amend their rules to provide a bit-free option. This

will allow the horse's needs to be met; the frequency of accidents to be reduced; the aftercare problem to be eased; and the social license of equestrian sport to be sustained.

Semantics

In 1921, when FEI (Fédération Equestre Internationale) rules were translated from French into English, the phrase *'dans le main'* meaning *'on the bridle'* was mistranslated as *'on the bit.* As a result, for a hundred years, one or more bits have been mandated for dressage.

Today, when research shows that a painless, safer, and more effective bit-free alternative has been developed, the phrase *'on the bit'* represents a semantic barrier to progress. Tradition trumps science and bits continue to cause avoidable pain, exposing riders to unnecessary risk. By continuing to mandate the bit, equestrian administrations such as the FEI are mandating pain and suffocation and breaching their own objective that "*the welfare of the horse is paramount*."

This would be regrettable enough if the inhumanity were confined to FEI competitions. Unfortunately, FEI rules are widely adopted by national federations and followed by Pony Clubs and 4H organizations. The result is that children who wish to compete are obliged to use an Iron Age aid that exposes them to unnecessary risk.

Figure 54. On March 18th, 2002, at the Taunton Vale event, the 'Quit the Bit' team, comprised of Mark Smith and his son Will Smith, together with Georgina McKeown and Charlie Deutsch made team chasing history by being the first entirely bit-free team to be place in an Open Team Chase

CONCLUSIONS

Requiring a horse to 'accept' the bit is like forcing a bat into the light.

Mandated-bit rules and, in racing, bit usage as 'standard practice' have the effect of both causing harm and, because bit-free comparison is ruled-out, of shielding the enormity of the bit from being revealed. Yet the evidence that a bit causes a horse pain is overwhelming. This alone is reason enough for discontinuing its use in all disciplines. There is, in addition, sufficient evidence to infer that a bit suffocates and, in a racehorse particularly but not exclusively, triggers a pathophysiological cascade of negative pressure pulmonary oedema, catastrophic accidents and sudden death. Testing of this last inference awaits action on the pain-based recommendation. An updating of the protocol for sudden death autopsies would, I believe, bring to light critical evidence of bit-induced suffocation (Cook 2021). Lastly, for racing as for all equestrian sports, it seems likely that a bit-free horse that can breathe freely and is not in pain will show improved performance.

In a review of mouth pain in horses David Mellor, Professor Emeritus in Animal Welfare Science concluded, "*So, how might we proceed? We cannot simply ignore the bit problem, which has now been identified so clearly. Inaction when a problem is not apparent is understandable. Inaction once a significant problem has been recognized is unacceptable. Recognition of such a problem brings with it an ethical responsibility to act*." (Mellor 2020a).

In his review on bit pain, Mellor lays out some recommendations for a way forward (Mellor 2020a):

- *Familiarise ourselves with the literature in this area*
- *All veterinarian horse riders should try bit free riding to experience the benefits firsthand and lead by example by choosing to ride bit-free*
- *Address this topic in veterinary undergraduate teaching and equine veterinarian's continuing education and professional development*
- *Participate in education of clients and other equine professionals*
- *Consideration in diagnostic workups by removing the bit in all investigations of airway problems, poor performance, lameness, and behavioural/training issues*
- *Advocating for allowance of 'bit-free' riding in competitions and riding clubs*
- *Alteration of standard autopsy protocols (Cook 2022) to gain a better understanding of causes of sudden death, particularly applicable to racehorses*
- *Updating of position statements by professional bodies and organisations to reflect current knowledge*

Once a decision has been made to go bit-free, the actual process of switching from bit to bit-free is disarmingly simple, i.e., replace a 'biting-bridle' with a 'bite-free' bridle. After one or two minutes of groundwork, the horse is ready to be ridden. As described above, four horses that had been bit-ridden all their lives were transitioned at the CHA Conference in one afternoon (Cook and Mills 2009). In all four horses, a significant improvement in performance was recorded in a four-minute trial.

The 66 horses in the second trial (Cook and Kibler 2018) were evaluated after being bit-free for about a month; again, with statistically significant improvement in performance.

The decision to start bit-free trials for an equestrian sport will need committee agreement and planning. Once this is achieved and trials start, encouraging signs of behavioral improvement can be expected on day one, with further improvements in the following months as trials continue. Equestrian sports need to act promptly and in a demonstrably convincing way to show evidence for sustaining their social license to operate. Allowing bit-free competition in equestrian sport will enable the bit-free advantage to be recognized. The superior performance of bit-free horses will provide the evidence needed to support the continuance of equestrian sports' social license to operate.

For good reason: horses hate the bit.

It would be difficult to overstate the enormity of harm that this Iron Age device causes. Removing it is a win-win-win situation for horse, rider and equestrian sport. Bit-free competition will allow horses to run without being handicapped by pain and shortage of breath. Let's give horses the chance to show us the full scale of bit-free benefits, many of which have yet to be brought to light.

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