

The horse's mouth, showing the age by the teeth. Containing a full description of the periods when the teeth are cut; the appearances they present, the tricks to which they are exposed, the eccentricities to which they are liable, and the diseases to which they are subject / By Edward Mayhew.

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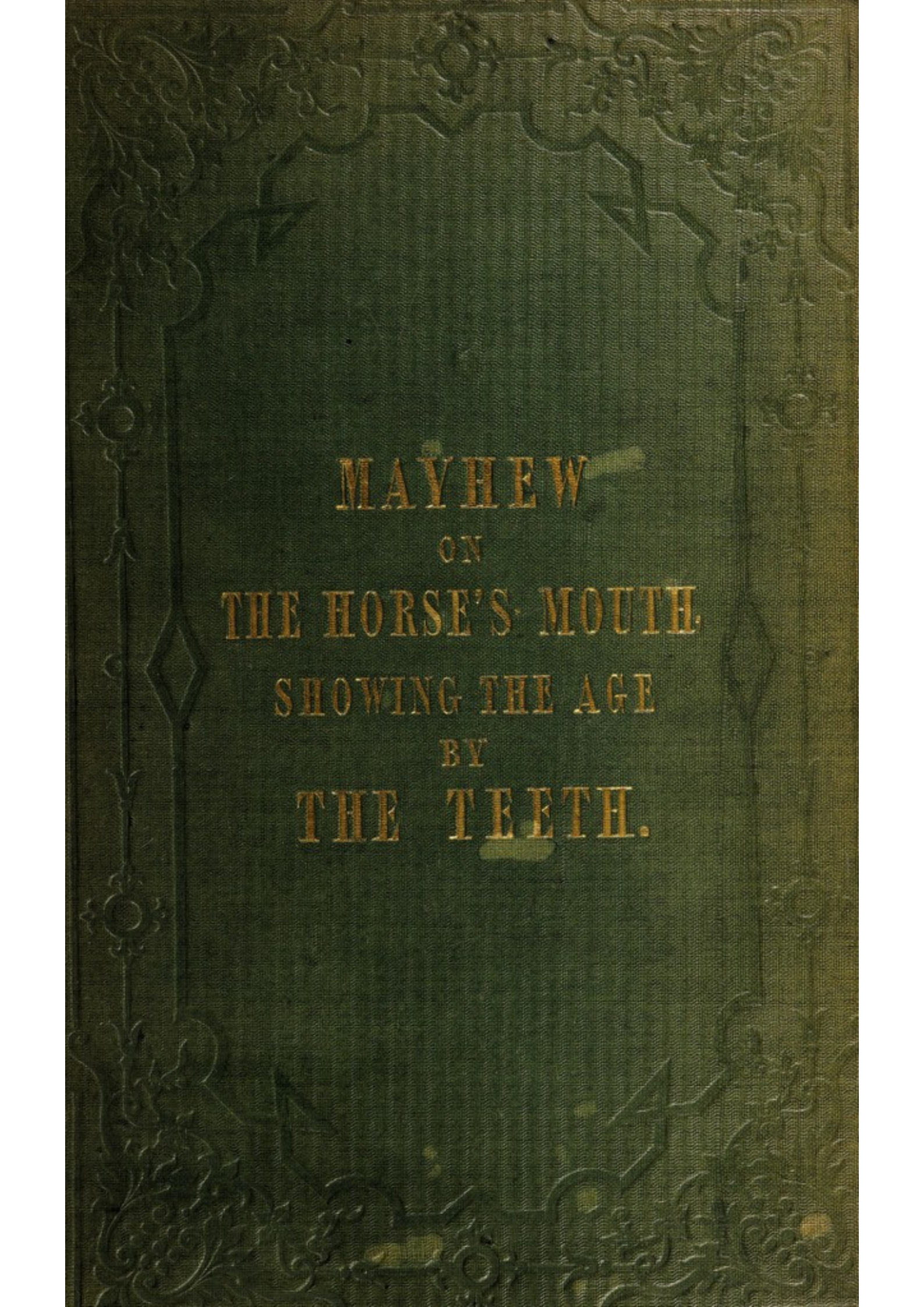
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MAYHEW
ON
THE HORSE'S MOUTH.
SHOWING THE AGE
BY
THE TEETH.

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THE HORSE'S MOUTH,



SHOWING THE AGE BY THE TEETH.

THE HORSE'S MOUTH,

SHOWING THE AGE

BY

THE TEETH.

CONTAINING

A FULL DESCRIPTION OF THE PERIODS WHEN THE TEETH ARE CUT;
THE APPEARANCES THEY PRESENT;
THE TRICKS TO WHICH THEY ARE EXPOSED;
THE ECCENTRICITIES TO WHICH THEY ARE LIABLE;
AND
THE DISEASES TO WHICH THEY ARE SUBJECT.

BY

EDWARD MAYHEW, M. R. C. V. S.

DEDICATED, BY PERMISSION,

TO

THE PRESIDENT AND COUNCIL

OF

The Royal College of Veterinary Surgeons,

AND EMBELLISHED WITH

NUMEROUS COLOURED ENGRAVINGS FROM
DRAWINGS MADE EXPRESSLY FOR THE WORK, AND
TAKEN FROM AUTHENTICATED MOUTHS;

WITH

THIRTY-TWO WOOD-CUTS, ILLUSTRATIVE OF THE LETTER-PRESS.

LONDON:

MESSRS. FORES, 41, PICCADILLY.



TO THE
PRESIDENT AND COUNCIL
OF THE
ROYAL COLLEGE OF VETERINARY SURGEONS,
THIS WORK

IS (BY PERMISSION) RESPECTFULLY DEDICATED,

BY THEIR OBLIGED AND

VERY OBEDIENT SERVANTS,

THE PUBLISHERS.

41, Piccadilly.

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P R E F A C E .

WHEN submitting to the reader this my first work on Veterinary Science, I cannot forbear from addressing to him a few remarks, in the hope of explaining some of those peculiarities which it may appear to present.

At a period of life, when many men retire from active business, I commenced the study of a new profession. My mind was not prepared to receive instruction through the ordinary process, and I was, by necessity, obliged to be, in a great measure, my own tutor. I found that I could learn only through observation, and this circumstance led me into inquiries which often left me in opposition with established opinions. Hence many of the facts announced in the following pages are new, and not very much contained in them is strictly accordant with the acknowledged authorities. The latter circumstance I may regret, but I have no apology to offer for it. My convictions are derived from the study of Nature, and are conclusions gained from a higher source than conjecture or opinion sanctioned by time or approved by professors.

Short as may have been my experience, nothing herein set down will be found which is not the result of practice, or the consequence of reasoning. Perhaps a longer professional existence would have given more weight to that which is either novel in its announcement, or may appear to be bold in its assurance. Truth, however, is speedily read by those who are intent on deciphering it, and facts are not rendered more clear to the mental vision by years of conventional dependence.

The teaching of our English Veterinary School has, for too long a period, been traditional; what one had said, he who succeeded him repeated, and when I entered as a pupil, there existed no spirit of inquiry, or thought of extending the boundaries of knowledge. To what a degree an evil system had been established, I may here state as an instance, that in the first horse which I dissected, I was able to demonstrate the existence of four muscles that had previously been unnoticed by my teachers.

Under such circumstances, it is not surprising if a fresh intruder, on a comparatively unexplored soil, did turn up something which, though it laid near to the surface, had not before been exposed. On the teeth, my investigations began from the beginning; and though I cannot but say I have been greatly assisted by the information derived from

the labours of previous writers, yet I have, in every instance, accepted their assertions only after I had tested them, and found them to be correct.

To the members of my profession, I am deeply indebted. When they knew the subject on which I was engaged, each volunteered to aid me, and generously gave me the benefit of that experience, which personally I was unfortunate in not possessing. It was acknowledged, that upon the teeth, some work which might be depended upon, was sadly needed, and to render the present worthy of the confidence of the public, all to whom I applied cheerfully gave their utmost help. From their cordial communications and disinterested co-operation, I learnt much, and gained many valuable ideas.

16, *Spring Street,*
Westbourne Terrace.

THE HORSE'S MOUTH,

SHOWING THE AGE

BY

THE TEETH.

1. *That the teeth of the horse denoted the age of the animal* appears to have been a very ancient belief, which the experience of centuries seems in no degree to have weakened. As a general rule, applied within certain limitations, the impression is certainly well founded ; for perhaps no development is more regular than the teeth of the horse, and no natural process so little exposed to the distortions of artifice. We are, nevertheless, not to expect that the animal carries about in its mouth a certificate of birth, written in characters so deep or legible that they

cannot be obliterated or misinterpreted. The indications to be discovered by an inspection of the mouth of the horse, however, are so generally true, that in these dependence may be placed ; although they are not so arbitrary or invariable, that upon them in every instance an absolute opinion can hastily be pronounced. He who would judge of the age by the teeth, must therefore be content to study and prepared to encounter difficulties. In proportion as he has done the one, and is fortified thereby to overcome the other, will be his success. There is no secret charm which will enable man to unravel Nature's mysteries. Her ways are regular, but they are not uniform—her laws are fixed, but her acts cannot be measured by a system of rule or compass. The qualified judge alone will read the teeth correctly ; but in proportion as the task is difficult, will be the candour and caution of him who fulfils it properly. He will make allowance where certain marks are indistinct or absent—he will not feel himself degraded by a confession of inability to speak with certainty when the signs are complex or confused—and above all, he will be cautious before he pronounces a final opinion, and gives it forth as a decision, against which there ought to be

no appeal. The Veterinary Practitioner knows from repeated trials, tested by long experience, that the teeth of the horse are worthy of attention; he feels that their indications, scientifically interpreted, will seldom mislead; but he does not regard them with a reverence resembling that originating from an antiquated superstition, or look upon them as the exemplifications of a principle which admits of no exceptions.

2. *In every case the evidence of the teeth is secondary to direct and substantiated testimony;* for as there is no limit to possibility, so no man can be prepared to say what Nature may or may not do. In the absence, however, of positive and corroborated testimony, the teeth become the best evidence, and that on which reliance should be placed. When opposed to the indications of the mouth, the oath of a single individual, for obvious reasons, would be of no weight. A foal can hardly be born without many parties being cognizant of the fact—the colt cannot change its master without several persons being made aware of the transaction—and horses, for honest purposes, are not generally sold or bought in secret. Proof of

the age can generally be adduced, if the parties interested think proper to seek it; or when it is not possible to adduce such proof, the teeth deserve more confidence than an uncorroborated assertion. An individual may be interested to mis-state, or may be mistaken in his belief; whereas the teeth, being natural growths, are removed from such suspicions.

3. *Some of the causes which induce certain persons to doubt* the possibility of the horse's age being accurately told from the teeth, are not difficult to explain away. The Jockey Club has seen reason to declare, that all thorough-bred animals shall be born on the 1st of January, or if any should make their appearances at a later period, such shall be esteemed one year old when the 31st of December has expired. All blood horses have but one birth-day, nor do they in that respect differ from their brethren of the coarser breeds; only those of the last description are supposed to begin their existences upon the 1st of May. If a racer has seen six Januaries, it is said to be six years old; and if a nag had looked upon half a dozen Mays it would be pronounced to be of a similar age. These customs are convenient, as affording a point from

which to date the age of an animal ; but under such regulations, confusion will and does frequently arise. In a long number of years, a few months may be of little importance ; but at the earlier period the difference of several weeks may, in the calculation of the age, be a serious matter. I will endeavour to show how far, in an extreme case, confusion may be created by the operation of these customs, and to prove, that he who should read the teeth correctly, would be unable to satisfactorily pronounce the accepted age of a colt. According to the received laws, a blood foal dropt on the 31st of December, and a foal not thorough-bred, born on the 30th of April, would each, the second day of life, complete the first year of its existence. Let it be supposed that a blood mare bore a foal in the latter end of December — the animal would be entered in the stud book according to the year of its birth, but for obvious reasons could never be put into training ; it would be kept until another January arrived, when, although but one year and a few days of age, it could, in strict accordance with the established custom, be sold as a two-year-old ; and the entry being in the stud book, of course the point would not be disputed. The colt is

bought and taken into an ordinary stable, where all the horses not being thorough-bred advance a year when the 1st of May appears ; and when that day dawns, the blood colt, not eighteen months of age, rising with the rest, is called three years off. Now in such a case, the man who judged by the teeth would be certain to be wrong ; and if it is possible under any circumstances for truth to be discredited, we may imagine that many apparent mistakes would, on inquiry, be cleared up. The age of a horse is seldom correctly stated even in a court of law. Witnesses swear by the customs of men, and it never seems to occur to them that Nature has not yet given in her adherence to the codes by which their consciences are narcotized. Horses are born at all times and seasons. The regular breeder, it is true, takes care towards the observance of the regulations ; but all who may think proper to have “a foal out of the old mare when she’s done up for work,” are by no means nice in that particular. Stallions are paraded for “service” in the autumn, and there are to be found men who will argue stoutly in favour of a “late get.”

4. *The teeth more frequently contradict an arbitrary calculation than disagree with fact.* The mouth declares only the positive age, reckoned from the actual day of birth, and I know of no evidence of a similar description which may be more confidently trusted. Occasional exceptions are to be found, and of these notice will be hereafter taken ; such exceptions, however, are not sufficiently frequent to upset the rule, and were the testimony of the teeth to be rejected, I know of no other that could be substituted. We are therefore necessitated to retain the test, and consequently should know how to apply it. Almost every one within or about the stable pretends to be able to do this, but some even of those who have studied the subject are not capable of doing it correctly. The evidence is often true when the judgment is false, and in this circumstance, perhaps, lies the chief danger of the test. A knowledge of the teeth is by no means universal ; but where that knowledge is profound, though the test may seldom disappoint, yet because it will occasionally do so, the indications of the mouth ought to be corroborated. To proceed summarily (as in the case of the Queen of Cyprus) upon an inspection of the teeth, is cer-

tainly not justifiable, since the mouth may possibly be eccentric, or the judgment pronounced upon it may be erroneous. The teeth in every horse case are of importance. The suggestions to which they give rise should not be disregarded ; yet at the same time no opinion of a final kind should be based upon their showing. The utmost that the inspection of the teeth could warrant is a doubt, certainly a strong one, as to the reported age of the animal. That doubt would justify inquiry, and the teeth can substantiate no more than the right to inquire. Some may be disposed to think that such a right would not be worth possessing ; but it must be remembered, that until the inquiry were ended, no decision as to the qualification of the animal could be arrived at. A valid doubt would have been created. Let the owner of the suspected horse dispel it, or the party who is interested to do so have time to seek the evidence which would convert it into certainty. The umpire, on the showing of the teeth, would be bound to withhold his judgment, not called upon to decide. Were such the rule, all fear of injustice would be guarded against ; and as gentlemen connected with the turf cannot endure suspicion, and are not very patient of delay,

those who were the owners of animals, the mouths of which presented any peculiarities, ought to notify the fact some days before the horses started. By forbearing to do so, gentlemen expose themselves to accusation. By examining the animal at the moment of starting, and founding a decision thereon, no good can be done, but injustice may be perpetrated; for supposing the suspected horse is pronounced to exhibit the tokens of the lawful age, the inspection of its mouth by a stranger may, by exciting its irritability, lose the race. At the same time, to permit an unqualified animal to start, would be unjust; and therefore the greater necessity for such a timely inspection as would allow of a preliminary investigation of the proofs that could be brought forward in contradiction of the teeth. These suggestions are made with the less hesitation, as the writer feels that were they adopted, few cases would spring out of them; for the mouths of racers are so regular in their development, that the age of this description of animal can with more certainty be pronounced than that of any other kind of horse.

5. *For the security of the purchaser of a horse not connected with the turf, the teeth are a sufficient guard,* and their indications, when properly understood, may be confidently acted upon. This opinion is put forth after a matured consideration of the subject, and probably there is no dealer who would dissent from the decision at which the author has arrived. The purchasers possibly may, on reflection, see less reason to be satisfied, because the teeth would, perhaps, in many instances, seem to favour the interest opposed to theirs. Let the matter, however, be deliberately weighed, and perhaps it may be found that neither party is likely to gain considerably, or to be seriously injured. In ordinary trade, the word of the seller is not much regarded ; but in horse transactions, the assertion of the dealer is never received. One source of evidence is therefore discarded, and some other must be sought. Now, where horses are concerned, even the oaths of men appear to be of little force ; “hard” swearing is expected in every business of that nature, and such expectation almost disqualifies all those persons to whose testimony the dealer could appeal. Let it be remembered that it is not the dealer who refuses to give evidence, or to

adduce it; but the purchaser, who is prejudiced against accepting it. This act on the purchaser's part limits the proof he might demand; for as attestation is rejected by him, not denied to him, he is by his conduct left without cause of complaint, and bound to seek the evidence which he will accept. Such evidence he looks for in the mouth of the animal, and is seldom deceived when capable of interpreting it. The teeth, in fact, are the only testimony that his caution leaves him to decide upon; and it will be hereafter shown, that even when the teeth are early in their development, the purchaser is not virtually wronged. All men, however, seek to arm themselves by suspicion, when dealing in horse-flesh; and the tricks that are played upon the teeth, rise immediately to the mind. Such tricks certainly are played, but they are assuredly more talked about than practised. There is a superstitious idea afloat, that breeders can make horses appear of any age they please, by torturing the mouths of the poor animals. The folly of such a belief will be exposed in another part of this work; it is sufficient for the present to state, that the credulity of the public in this matter has no foundation. A colt cannot be made by any

barbarity to look like a horse ; and an old horse cannot be forced to exhibit the mouth of a colt. That attempts are made to disguise the teeth, and that such attempts occasionally impose upon the buyer, is not denied ; but all of such practices are shallow in the extreme, and so easily detected, that the person deceived by them is not an object of pity. If people will presume to judge before they have learnt to recognize, their temerity is more to be blamed than its consequence is to be commiserated. No one goes to buy a horse unwarned of the dangers that will surround him ; and if in his conceit he rather prefers to hazard these than to seek protection, what right has he to murmur at a result which it needed no conjurer to foretel ? Is there any market in the world where ignorance is secure from imposition ? The world is not yet so honest that the affairs of the horse mart are a subject worthy of its special wonder ; and it may be doubted if the principles which regulate the conduct of the horse dealer, are not those which influence the transactions of the most honourable traders. There are men of the highest character living by the sale of horses ; and it is creditable to humanity, that after all of a certain class have been unscrupulously

stigmatized and openly reproached, there may still among its members be found, beings preserving honour for the sake of itself alone. The liberal public, however, in its wisdom, has pronounced the character of the horse dealer; it has rejected his attestations, and refused to listen to the testimony of those with whom he has communication. The age of a horse is not taken from the mouth of its owner, but looked for in that of the animal. This mode of procedure is convenient — the record is at hand, the evidence brief, and the decision to which it leads is that to which the purchaser by choice appeals. The dealer stands by and knows that his voice is to be restrained. The teeth denote the age, and when the word of the owner is not to be accepted, there is no other evidence at hand. Were additional proof to be required, in some instances it could not be procured, and in the majority its production would be attended with an expense perhaps equal to the price of the horse which it concerned. The expence, the seller of course could not be expected to bear, and the buyer equally would resist its infliction. Nothing is more high priced than absolute proof of any kind; and there is always a further difficulty in the difference

of opinion which prevails, as to what constitutes absolute proof. A cursory glance at the matter is enough to convince us, that the custom of inspecting the teeth of the horse to ascertain the age of the animal, is one which has had its origin in necessity. Experience has taught that the mouth of the horse affords the most satisfactory evidence, and the author's investigations on this subject have convinced him that the public need require no better or more conclusive testimony. The reader, however, before he ventures to abide by his own interpretation of the signs which the horse's teeth exhibit, must be content to study, and prepared to find the task somewhat difficult. All that can be done to render the subject plain and clear, the author will attempt.

6. *The description of the teeth* cannot be rendered pleasing ; but as it is a necessary part of the subject, the reader must exert his patience, while the matter is briefly discussed. Teeth are anatomically classed with bones, which in many respects they resemble. A tooth is divided into two parts, or into *crown* and *fang*. The *crown* is that portion which projects above the gum into the mouth ; therefore so much as

can be seen while the animal lives, is the crown of the tooth. The *fang*, the end of which is called the *root*, is that part of the tooth which is hidden from view, and is inserted into the jaw. For the convenience of description, however, other portions of the tooth have received distinct names, and the *neck* and *table* are spoken of. The *neck* is that portion of the tooth which is immediately surrounded by the gum. The *table* is the upper surface, or the part which touches the corresponding tooth of the opposing jaw when the mouth is closed. Such is the division made, and it will hereafter be found to assist the description of the various changes which the teeth undergo.

7. *The teeth are situated* in the maxillary bones, in which certain osseous cups, like indentations or holes, called the alveolar cavities, are developed for their reception. Each tooth has its separate cavity, and however close the crowns may appear, nevertheless each fang is divided from those before and behind by bony plates. The alveolar cavity always corresponds to the fang. As the fang alters in form, or diminishes in length, so does the shape of the

cavity simultaneously change ; and should the tooth be removed, the space, no longer needed, is filled up ; the alveolar cavity being obliterated by a growth of bony matter.

8. *Teeth are organised*, that is, they possess nerves, arteries, veins, and absorbents, or are endowed with those vessels needed to resist decay, and to promote nutrition. That a tooth possesses nerves, no one who has submitted to have these members filed by the dentist, or who has endured the tooth-ache, can for an instant doubt ; and that they are even, in some degree, susceptible of external impressions, the sensation produced by certain acids seems to render probable. The growth they exhibit shows they are gifted with arteries and veins ; and these vessels can be traced directly to and from, though not unto, their substance. The existence of absorbents some have doubted ; but the removal by nature of the fangs of the temporary teeth, clearly testifies the presence of these vessels.

9. *The horse possesses forty teeth*, viz., twelve incisors, four tushes, and twenty-four molars. The

incisors, sometimes called *nippers*, are those which, situated in front of the mouth, are seen when the lips are parted. They are the instruments, by means of which the animal bites its food, and are placed six in the upper, and six in the lower jaw. They are classed as pairs, being generally cut or developed after that fashion. The middle two, in both jaws, are called the *centre* incisors; the two most backward, on either side of the mouth, the *corner* incisors; and the teeth, by which the corners and centres are separated, the *lateral* incisors. Of the *tushes*, the two placed in the lower jaw are the most forward. These teeth, which are sometimes termed canines, and sometimes *cuspidati*, (from *cuspis*, a point,) are isolated, appearing in the space which divides the incisors from the molars. They are only fully developed in the male, the mare often being without any indication of them, and never displaying them in so prominent a degree as the horse. Their use is not very apparent, but they certainly would be employed in those combats to which stallions seem naturally predisposed, and would render the grasp, and the wound it could inflict, more severe. Because the mare is of a more pacific temperament, Nature seems to have denied to

her a perfect tush, by the presence or absence of which, the sex is indicated by the mouth, and upon which castration appears to exercise no influence, since the gelding has as well-formed a tush as the perfect male. The *molars* are ranged in companies of six, one company on either side of the upper, and a like number similarly situated in the lower jaw. The molars are the instruments which enable the horse to grind down the fibrous and hard food upon which it subsists, and they are distinguished by their locality, as first, second, third, fourth, fifth, or sixth molar tooth of the near or off side in the upper or lower jaw; the first being that growing in front, or nearest to the incisors, and the sixth that placed most backward in the cavity of the mouth.

10. *Three substances enter into the composition of the horse's tooth.* Each of these substances is distinct, and can be distinguished from either of the others. The names given to the various parts are — 1, *crusta petrosa*, or hard crust; 2, enamel; and 3, ivory.

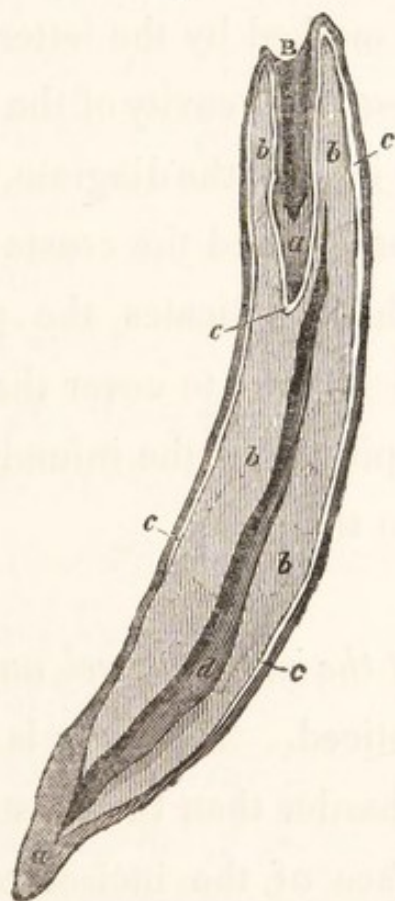
11. *The crusta petrosa* is the most externally situated, and when the tooth first appears in the mouth, it

is entirely coated by this substance, having a somewhat dull and dark appearance, which is only lost when the hard crust is removed by attrition, and the enamel thereby exposed. In amount, the crista petrosa is second to the ivory, being more in quantity than the enamel. In composition, it is characterized by containing a great amount of animal substance; and, in structure, it is peculiar for exhibiting, under the microscope, numerous corpuscles or cells, from which pores or minute tubes appear to radiate. Within the alveolar cavity, the crista petrosa, which around the fang becomes of considerable thickness, is of a yellowish white colour; but where, in connexion with the crown of the tooth, it is exposed to the chemical action of the food and air, it presents a darker aspect and looks like an accumulation of tartar, for which indeed it has been mistaken. It fills up the infundibula of the molars of the upper jaw, and lines those of the incisors, being pierced by all the vessels which nourish the teeth. If a tooth be subjected to the action of dilute hydrochloric acid, the enamel will be removed, and the ivory and crista petrosa be rendered separate and distinct.

12. *The enamel* of the horse's tooth appears to be unorganized, and to contain no animal matter. Hydrochloric acid entirely dissolves it with a slight effervescence, and though a few and a very few threads remain, these rather seem to be connexions between the ivory and crusta petrosa, than component parts of the enamel itself. That the enamel is an unorganized substance, it may be essential to state, is asserted only of this body in the tooth of the horse; for the enamel of the cow's tooth is of a different nature, since hydrochloric acid does not dissolve it, affect its whiteness, or destroy its form. The enamel is the least of the three components of the tooth; of a whitish semi-transparent shining aspect, it forms a thin crust to the ivory, lying immediately under the crusta petrosa, and extending nearly to the root.

13. *The ivory* forms the main bulk of the tooth, and though blood vessels can be traced to, but not within its substance, yet it presents numerous pores or minute canals, radiating from the centre to the circumference, which the mind naturally associates with nutrition. These pores cannot be traced to the

cells or corpuscles of the crusta petrosa, though in works of high authority, drawings obviously indicating such a connexion, are presented; they are limited to the ivory, and terminate within it. What their exact use may be, is not known, but that they are of service, their presence is sufficient proof. Like the minute canals of bone, they probably convey a serous or colourless fluid, for the nutrition of the part in which they are developed.



The relative positions of the various structures that enter into the composition of the incisor tooth, will be

better understood by reference to the accompanying wood-cut, which represents one of those members divided down its centre :— *a* indicates the crusta petrosa, which can be traced to enclose the organ, and to dip down the infundibulum *B*. The crusta petrosa is shown to be thicker at the root of the fang, and at the base of the infundibulum, than at other parts. *b* denotes the ivory, which forms the principal and central portion of the tooth, in the middle of which is the darker space marked by the letter *d*. This last is intended to represent the cavity of the pulp, which, in the young incisor is, as in the diagram, of great length. Between the ivory *b*, and the crusta petrosa *a*, is a white line *c*, which indicates the position of the enamel, and will be seen to cover the upper surface of the tooth dipping into the infundibulum, but not to extend quite to the root.

14. *The uses of the ivory, enamel, and crusta petrosa* must be now noticed. The ivory is less dense than the enamel, and harder than the crusta petrosa. On the external surface of the incisor teeth, the crusta petrosa is, by the attrition to which this part must be subjected during the gathering of the food, soon

sufficiently removed to expose a portion of the enamel : as the years of the animal increase, the outer coating is almost worn away, and not being reproduced, little of the *crusta petrosa* will be found on the nippers of very old horses. The ivory, however, is always nearly on a level with the enamel, notwithstanding the greater attrition which the substance forming the principal portion of the table of the tooth must necessarily endure. A sufficient indentation of the ivory, nevertheless, can be observed, to render prominent the ridge of enamel, and to indicate that the last-named material is endowed with the greatest power of resistance. The enamel, in fact, is as hard as flint, and by striking it against a steel, fire can be drawn forth. The three structures, therefore, vary in hardness, and in an opposite direction they contrast to one another in toughness. The ivory is sometimes fractured, but not frequently. I have never seen the *crusta petrosa* of a living tooth exhibit such an injury ; but the enamel is rarely inspected without its being discovered to be more or less in a ragged, chipped, and broken condition, especially at the anterior edge of the table of the incisors.

15. *The separate uses of the three component structures*, however, is not well shown in the incisors; for as the crusta petrosa is by a natural process removed, and the ivory is not of essential service in cutting the food, it might be supposed that the first was no more than a temporary covering to, and the last only a basement for, the enamel. When the mind, however, is directed to the observation of the molars or double teeth, the properties and uses of all become apparent. The sense of touch in the horse resides in the lips; with those organs he gathers together the food before he grasps it with the incisors. Delicate, however, as the animal's sense of touch is, the selection of the food is further aided by the sight and smell. The most fragrant, the softest, and the cleanest portions, therefore, are selected; but it would be too much to suppose, that no particle of dirt, sand, or grit, was ever taken into the mouth. That much is necessarily bitten, the incisors of those horses which pasture on sandy soils, afford sufficient proof, as such animals generally exhibit the anterior edges of those teeth considerably jagged or notched. In the best fields, the grass is never free from adherent impurities, and the manger, as well as the

rack, is not always remarkable in that respect. All, however, that is gathered by the lips, or grasped by the incisors, passes to the molars to be comminuted and mixed with the saliva previous to being swallowed. The molars, in fact, are animal grindstones, and the different degrees of hardness which the three component substances display, by wearing unevenly, always keep the grinding surfaces irregular or sharp. The inequality of the grinding surfaces of the molars enables the horse to reduce the toughest fibre to a pulpy mass; but as many substances little less hard than the tooth itself must frequently be ground up with the food, the molars would, at first sight, appear to be subject to injury, especially as they have ten times the work of the incisors to perform, and the senses of touch, smell, and sight, cannot operate for their protection. Nature, however, has provided against the danger to which they appear to be exposed; for if, notwithstanding the guarding agency of the senses, the incisors are so often injured, the molars, blindly employed, and used when the full power of the horse's jaw is exerted, certainly needed some provision against fracture. The *crusta petrosa* gives all the security that could be desired; it en-

circles these teeth, dips into their fissures, and fills their infundibula, forming no small part of the substance of the molars. The subjoined wood-cut will better explain the manner in which the various substances are arranged.

Fig. 1.

Fig. 2.

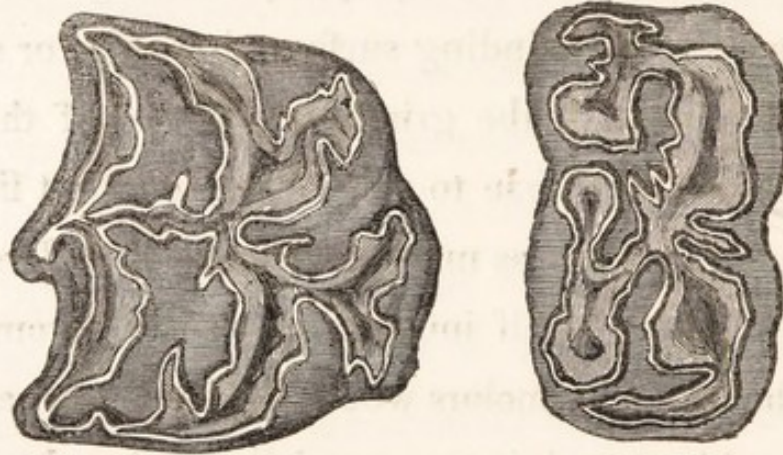


Figure 1 represents the table of one of the molars taken from the upper jaw. *Figure 2* the table of a molar extracted from the lower jaw. The difference of size between the two organs is thus well marked, as also the difference of shape. The white line indicates the enamel, and the variegated substance which is encircled by it, denotes the comparative quantity and position of the ivory. The crista petrosa is represented by the somewhat darker shade situated on the exterior of the enamel. In figure 1, however,

the reader will observe two patches enclosed by white lines. These are the representatives of the two infundibula which exist in all of the molars of the upper jaw, but which are not developed in the lower teeth. The similar direction of the lines will enable the reader to connect them with the crusta petrosa, which substance, save in the newly-cut tooth, generally fills up these cavities, although the enamel lining extends almost to the root. The intricacy of the arrangement is, by this diagram, made apparent, and the purpose rendered plain. Without such a provision, the first meal of the animal consumed would probably shatter the instruments of mastication into innumerable atoms ; but girded round, and bound up with the tough and resistant crusta petrosa, however hard may be the fibre the animal chews—however much of grit or sand may be contained in it—or however great may be the force by which the molars are pressed together, and made to pass at the same time from side to side—not a particle of the brittle enamel is fractured. Like a thin layer of glass, guarded between two pieces of wood, it performs its office in security ; and as the necessity for the provision, towards which I have directed atten-

tion, is obvious, so is it the more strange that the thick coating of the crusta petrosa around the molars should by authors have been mistaken for an accumulation of tartar. The mistake was certainly extraordinary, as the crusta petrosa in the horse's tooth is of physiological importance, and will presently be shown to merit the attention of the pathologist. I am aware, when making this statement, that contradiction is offered to the opinions of many and deservedly esteemed authorities ; and while I regret the necessity of differing with such writers, I also lament that my opinion as to the supposed use of the outer membrane of the newly-developed organ, does not coincide with theirs. The nature of this treatise will not allow me to enter into the subject of the development of the teeth ; but I may here say, that the outer membrane has been generally stated to secrete the enamel. It is that membrane which, thickening with the growth of the tooth, becomes the crusta petrosa ; but with regard to its secretive powers, I do not imagine it is endowed with any function of that description, or that it is in any way concerned in the production of the enamel. My reasons for making such and so bold an assertion are well considered,

not hastily advanced. I have before me the left anterior molar, taken from the jaw of a colt which was rising four. A representation of the tooth alluded to is here given.



a denotes the crusta petrosa, *b* the outer surface of the enamel, the lines representing the plated or finely grooved aspect, which this part exhibits on its exterior. *c*, which letter will, on inspection, be discovered in the centre of the darkened space to the right of the lower portion of the enamel, indicates a spot where disease was existing, and to which reference will be hereafter made. *d* denotes the roots, which, as will be seen, are (although the tooth

had been in active employment for twelve months) still incomplete, and not enveloped by crusta petrosa. The above wood-cut, the accuracy of which is not to be disputed, shows a comparatively large portion of the assumed secretive membrane to be absent. The deficient part of the outer covering, I may here state, was removed by a natural process, as I myself extracted the tooth. Nevertheless where the crusta petrosa is deficient, the laminated external surface of the enamel is exposed in perfect and normal condition. This evidence appears pretty conclusive, for where the secretive substance is absent, the secretion would hardly appear. On the other hand, if the secretion of the enamel were the special function of the crusta petrosa, then wherever the one was found, the other would also be present. Let the reader, however, refer to the wood-cut inserted at page 21. In that diagram, the crusta petrosa is faithfully represented as thickest at the root; but at this very point the enamel is seen to be entirely wanting. The conclusion towards which such facts point, is almost decisive; but, nevertheless, there are many inferences which help to support it. If a longitudinal section of a tooth be made, a very thin white line

may be plainly seen, indicating, probably between the ivory and the enamel, another source for the production of the substance which the crusta petrosa has been said to secrete. Moreover, if a tooth be boiled for some hours, a very little force will enable any person to pull off the enamel from the ivory ; and this experiment likewise suggests the intervention of some gelatinous membrane between the two structures. The microscope also confirms the opinion I advance, and shows that, in the old tooth, the membrane is absorbed, for its remains can only be detected in isolated places. I am fully aware that none of the arguments here advanced are, with the exception of the first, at all conclusive. Appearances are deceptive, and results consequent upon artificial processes by no means to be trusted. After all, however, the necessity for such a secretive membrane is by no means imperative for the production of the enamel. Our views on these points may be too circumscribed, since at the extremities of the bones we see cartilage and osseous structure connected, without any such interposition ; and no one expects such a matrix for the vitreous table of the cranial parietes. The crusta petrosa may have its uses apart from any

conjectural function of secretion ; and, in further proof that it does not secrete, it can, in the young subject, before the tooth has emerged from its primary cavity, be separated with the greatest facility from the enamel. It serves to protect the enamel, but it likewise answers the end of keeping the tooth firm in the jaw : around the neck of the molars it becomes thickened to a great extent ; and at the roots, especially of old teeth, it exhibits considerable substance. The horse's molars are continually being wrenched from side to side while the food is being ground, and unless they were very firmly mortised, the vessels which nurture them would be continually lacerated : this the *crusta petrosa*, by entirely filling the alveolar cavity, prevents ; and as the molars wear down with age, the thickening of the membrane enables the jaw to retain with security the latest portion of the tooth. I have specimens taken from very aged subjects, where the fang having been worn away, the molar consists merely of the roots of teeth embedded in a mass of *crusta petrosa*.

16. *The various parts and peculiarities of form,* now require consideration. If the table of an incisor

tooth be observed, a cavity will be seen in the centre of it: this cavity, called the infundibulum, is of variable depth. In the temporary or milk teeth, it extends only half way down the crown; in the permanent or horse incisors, it is from three quarters of an inch to an inch and a quarter deep, being of greater depth in the teeth of the upper than in those of the lower jaw, and not of the same magnitude in all horses. The infundibula are indentations in the body of the ivory, and they possess two coverings, an external one of *crusta petrosa*, and internal investment of enamel: the enamel does not materially vary in thickness upon this part, but the *crusta petrosa* of the infundibula is, in different subjects, of very unequal extent. In some animals it becomes very thick, and in such, the infundibula seem soon to be obliterated, owing to the *crusta petrosa* filling up the cavity. A good specimen of the early obliteration of the cavity, by the thickness of its investing membrane, is shown by the teeth preserved with the jaw of the horse Leander, which is now in the possession of Mr. W. Field. That animal, though but four years old, had lost the "marks" in the central incisors. A white line,

however, shows that the enamel dips deep into the substance of the ivory, and indicates what would have been the form of the infundibula, had not the crusta petrosa filled up the cavities. The infundibula have received special attention from horsemen, and have been thought to indicate correctly the age of the horse; their lining membrane speedily becomes blackened by the chemical action of the food, &c., constituting what are called the "marks" of the mouth; and as the teeth undergo wear, these marks are ultimately lost. The period at which they may disappear, and the appearances which they may put on, are well shown in a plate which Mr. Fores has published, entitled "*The Age of the Horse*," and to that plate I therefore refer the reader; but, while doing so, I must caution him not to depend too much upon a sign, which is only true as a general rule; for as the infundibula in all animals are not of the same depth, or supposing them to be of one depth, the crusta petrosa is seldom of the like thickness in any two horses, and the teeth do not wear uniformly in different subjects, of course the indications they exhibit cannot be absolutely relied upon. Those indications, however, ought to be known, and

should never be disregarded. Some animals of seventeen years of age, and even in rare instances of twenty-eight years old, will retain the marks in two or more of the incisors; nevertheless, as a general rule, these signs are worthy of attention, and, taken in conjunction with the illustrations presented in this work, afford all that can be obtained to confirm the judgment.

17. *There are infundibula also in the molar teeth,* but not in all of them. Those of the lower jaw have no infundibula, but only grooves or fissures, into which the crusta petrosa dips, and which it fills up. The manner of the arrangement will be seen in the table of one of these teeth represented in figure 2, page 26. In the same place, the wood-cut, figure 1, depicts the grinding surface of one of the superior molars. Every tooth of the last description, possesses two infundibula, which extend almost to the root, and are possessed of the same coverings as the like cavities in the incisors. The crusta petrosa, however, which lines the infundibula of the superior molars, is much thicker than the similar membrane inverting the like parts in the incisors; consequently, absolute cavities, answering

to the marks of the nippers, are of comparatively slight extent, soon obliterated, and not generally found in any of these teeth after the horse is six years old ; indeed all the marks are often obliterated before the fifth year.

18. *To distinguish an upper from a lower molar tooth* is not difficult. The presence of the infundibula in the first would alone enable it to be pointed out ; but there are other indications that are worthy of a passing notice. The table of the upper molars is much broader, being compared to those of the lower jaw as nine is to five. Then the form of the table is different in each. The table of the lower tooth is indented on either side, the indentation extending downwards along the fang. The table of the upper molars present two narrow prominences, and two broad grooves on the outer side ; and also exhibits one broad prominence upon the centre of the inner side—all of these development being likewise contained along the fang. The slant of the tables also differs. In the upper jaw, the outer edge is the lowest. In the lower jaw, the tables incline in the opposite direction.

19. *The teeth of the horse are very firmly implanted in the jaws.* The fangs are of a length which they who have only seen the teeth extracted from the mouth of a human being would hardly imagine. The length of fang of course gives the teeth some security; but this is not the only provision made for that end. The teeth radiate towards a common centre, being widely separated at their roots, but approximating at the crowns. They also incline laterally from the perpendicular, so that the force applied to them never acts in a direct line, or is concentrated upon one particular point.

20. *The molars of the lower jaw are the active agents of mastication,* for motion, during this process, only takes place in that part of the head in which those teeth are placed. The inferior molars are the instruments that grind—the upper molars are simply the surfaces upon which the food is ground. The whole of the molars, however, are never simultaneously employed. The horse can chew but on one side at a time, for as the inferior maxillary bone is considerably narrower than the superior, if the teeth on one side are brought into apposition, those of

the opposite side are necessarily separated. Any one who has observed a horse feeding, will have remarked that the animal, during the act, continually abducts and adducts, the lower jaw not causing it to describe a circle, as does the cow, but urging it first to one side and then to the other. It will be seen, therefore, that the whole force of those strong muscles, which close the mouth of the horse, is employed on a portion of the jaw at the same moment, and the power then exerted must obviously be very great. Recognizing this fact, the reason for all that has been pointed out—the shelving tables—the grooved or indented sides—the double inclination, and the great length of the fangs is at once perceived, for the action is a wrenching one ; and the greater extent of, and more uneven, surface presented by the molars of the upper jaw, facilitates the comminution, without imposing weight upon the muscular activity. Had the larger teeth been implanted in the inferior maxillary bone, the labour imposed would have been much augmented, and the end attained have been in no way expedited.

21. *Provision has been made by Nature to meet the wear to which the horse's teeth are subjected.*

Such provision, however, I am of opinion, has been somewhat mis-stated by the majority of writers who have treated of this matter. Many of these authors dwell greatly upon the growth of the teeth of the horse, as though this function were in constant activity during the life of the animal. The arguments by which their views are supported, are primarily drawn from analogy rather than deduced from observation. Because the teeth of certain animals, especially those classed by naturalists as rodentia, and of which the rat and rabbit are familiar types—because the teeth of these creatures are known to grow, and those of the elephant are also proved to increase—the same is assumed of the horse. The inference is certainly of strength, but nevertheless it is far short of proof; a similarity between the animals is not demonstrated, and a sameness cannot be shown. Moreover, in another direction, an evidence is attempted to be made of the consequence which ensues when one of the molar teeth loses its vitality; the tooth that so suffers is rapidly worn down, and the opposing tooth becomes of an unnatural length, projecting far beyond its fellows. The increase of length in such a case has been supposed to go on in the

sound organ at the natural rate, and the growth of the diseased tooth only has been thought to be stopped ; hence the amount of wear and of growth is attempted to be measured ; but on consideration it will be seen, that something more than the mere cessation of increase has to be calculated. The carious tooth had ceased to be a part of the living body, and with its vitality the organ lost its capability of self-preservation. The condition of the part had changed, and of the strength which vitality bestows, all persons must be conscious. To argue from the results produced upon dead matter, and then apply the deductions to living organs, is a course which no physiologist will sanction. The tooth that had ceased to live, might be quickly worn down, for other reasons than that it had ceased to grow. This is so clear, and the inference to which allusion was formerly made so obviously untenable, that I shall not longer detain the reader by dwelling upon either, but proceed to state my own views of the subject. I admit the teeth of the horse do grow, and only doubt if the process has been properly described. When the crown of the tooth first appears in the mouth, the fang is not completed, and the root has

not even been developed. The horse is seven years old before all the roots are perfected, and when these are completed, I doubt if the after growth is material. If the jaw of an old horse be examined, the alveolar cavities will be found to be shallow, showing that the loss, consequent upon the wear, was compensated by the tooth being projected into the mouth, and not by any increase of substance. Again, those animals, the incisors of which retain the marks in extreme old age, may show long teeth, but not of that excessive length which growth would suppose; only such as the want of wear would occasion, supposing the increase to cease when the root was perfected. The fang, in fact, is so much tooth in reserve, and as such answers the purpose for which growth was supposed to be necessitated. I have by me, specimens of old teeth, but the measurement of none of them contradicts the opinion I have advanced, there being but a material increase of the *crusta petrosa*, which at the root blends with the ivory, and cannot be clearly separated from it. The thickening of the *crusta petrosa* around the root and neck, probably never ceases during the health of the animal; but to this substance alone is confined

the imaginary growth of the horse's teeth. When the roots are perfected, the length of the tooth is completed, and the only after process consists in a gradual deposition of earthy matter, within the body of the member, the bulk of which is defined. In old teeth, the ivory becomes very dense; and he who attempts to cut through an old and young tooth, will be made aware of a contrast. The pulp in the teeth, after the formation of the root, gradually diminishes and ultimately disappears, in consequence of the ossific deposition. In fact, when growth ceases, consolidation has taken place, and rendered its continuance no longer necessary.

22. *The cavity of the pulp* has been always stated to exist in the tooth of the horse. In the human tooth it occupies the extremity of the fang, being situated within the substance of the ivory; and the double teeth are known to have as many cavities of this kind as there are roots to the part. The same has been assumed to be the case also with the horse, but I cannot say that investigation enables me to corroborate this opinion. I find no cavity, that is no empty space, constantly present in the fangs of the

horse's teeth, and no separate or defined cavities at the roots of the molars. The bone or ivory may be deficient, more or less, towards the centre of the fang; but this space, not yet occupied by the osseous deposit, is filled by a membranous substance which is continuous with the crusta petrosa of the root, and will ultimately be converted into bone. I cannot separate the tissues forming the pulp, from the crusta petrosa itself; and I assume the two to be continuous. The only difference I can observe is, that the tissue of the pulp is the finest; but as the vessels of the one primarily pierce through and ramify upon the other, I cannot perceive the necessity for their separation. It will be understood, that I am speaking of these parts in a fresh subject, and not alluding to a mascerated and dried specimen, the appearance presented by the last being calculated to mislead. With age, the pulp diminishes; and in a tooth extracted from a very old animal, no positive remains of it will be found — osseous matter filling up the space which the pulp once occupied.

23. *Nature provides the horse with two sets of teeth.* The first are small, or of a size proportioned

to the diminutive stature of the foal, and are called milk teeth—colt's teeth—or temporary teeth—either of which terms equally well characterizes them. The temporary teeth are twenty-four in number — six incisors in either jaw, and three molars on both sides of the upper and also of the lower jaw. The incisors sometimes begin to appear in the mouth before birth, though generally the gums are unbroken when the foal is dropped ; they commence to be shed when the colt is two years and a half old—none remaining in the jaws after the fifth year. The molars, which are the first, second, and third, or the anterior three, begin to be cast off at two years and a half, being entirely removed between the third and fourth year. It used to be asserted that the last temporary molar was shed between the fourth and fifth year of the animal's life ; but while I was connected with the Veterinary College, I inspected several heads and found none that corroborated the doctrine, which, for half a century, had been inculcated at that Institution. My observations were at first violently contested, and opportunities were sought to uphold the received and old manner of teaching. By slow degrees, however, the truth prevailed ; and I

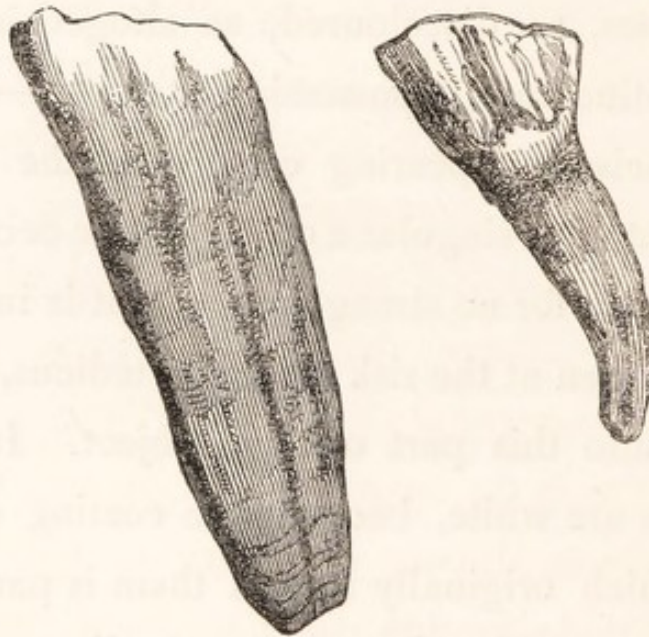
have now the pleasure of knowing, that what I pointed out to the professors, those gentlemen at present communicate to their pupils. Several parties, however, have been mean enough to pretend they either are ignorant of what I effected, or believe what I accomplished was the work of another person; while I am sorry to add, that a professor has even gone so far as to lay claim to a discovery, which at the time cost me some pains to fully make out, and more to firmly establish. My observations were, in the first instance, made alone, and the only person who eventually assisted me was Mr. I. K. Lord, of Tavistock. That gentleman did afford me much help, and to him I beg publicly to record my sense of obligation. No other individual was in any manner concerned in the investigation, and I regret that I should be necessitated to make such an assertion. The point, however, is now fully established; and it will be seen, that it may be of practical importance. The molars, as truthfully as the incisors, denote the age; and, as corroborators, they should, in every doubtful case, be inspected.

24. *To know the temporary from the permanent teeth*, or to be able to distinguish one from the other, is very essential; but such knowledge is not so common as may be generally imagined. Dealers have blundered, and many a gentleman having purchased a yearling for a horse, has afterwards been surprised to discover that the animal was losing some of its front teeth. These kind of mistakes are mostly confined to the smaller breeds—with ponies the incident is common enough, but even with horses it has occurred. I may therefore be excused if I enter rather minutely into those points of difference which distinguish the one from the other. The reader must be content to study well this portion of the treatise, for the age is best marked by the number of milk teeth retained in the jaw, and easiest told during those years when these teeth are in the course of being shed.

25. *To recognize a milk incisor tooth* the reader must bear in mind that it is of a temporary nature, and intended only to exist during the few first years of the animal's life, or during its colthood; for when all the permanent teeth are fairly up, the creature

becomes a horse. The recollection of their temporary character will cause them to be the more easily distinguished: they look less solid and less firm; they are smaller, more white, and if ideas of beauty and sentiment befit such a subject, have a prettier and more innocent appearance. This is perfectly true as a general rule, but nevertheless must not be absolutely applied; for I have seen rare instances in which the milk teeth were, from constitutional or other causes, so discoloured, as altogether to lose their infantine and prepossessing character—the permanent incisors appearing cleanly by the contrast. On account of so singular a circumstance occasionally happening, if for no stronger reason, it is imperative therefore, even at the risk of being tedious, to enter minutely into this part of the subject. In colour these teeth are white, because the coating of *crusta petrosa* which originally invests them is particularly thin, and soon, for the most part, disappears, exposing the enamel; their crowns are shorter, and the neck is well developed, because their fangs are narrow and of less length. In the annexed wood-cut, for the purpose of making the dissimilarity the more conspicuous, a temporary and a permanent incisor

are contrasted. *Figure 1* is the horse, *Figure 2* the milk tooth. The fang of the milk tooth is properly represented of considerable less diameter than the crown; and just where it arises will be observed a little shading, which indicates a sinking in, or nipping up, at that particular spot: the place so narrowed is the neck, which in the temporary teeth of the colt is not badly developed.

*Fig. 1.**Fig. 2.*

However, while the milk tooth is retained in the mouth the neck is not particularly well shown, because the gum encircling the crown in a great measure conceals that part. But the form of the outer surface of the crown can hardly be mistaken. In the

foal's tooth it more or less approaches to a semi-circle, from which the permanent teeth greatly differ, as will be seen by comparing the representations of the two as given in the plates. The outer surface likewise is characterized by peculiar indentations: a number of small channels run along it, taking a course from the neck towards the margin of the table, and giving an irregular fluted appearance to the enamel. There will be seen, on the crown of *Figure 2*, lines intended to convey an idea of the situation and direction of these little grooves. The table is always oblong, but the infundibula are generally absent after the second year, and when they are present, the cavities are narrow, and obviously of little depth. These numerous signs enable the milk tooth to be recognized with facility, at a single glance, for it is seldom that one of the various indications is absent; and after all have been impressed by observation, the milk tooth can hardly be mistaken.

26. *The permanent incisors are indicated by their greater size, a circumstance which the foregoing wood-cut does not exaggerate. The gum is much*

further retracted, and this gives to these organs an irregular oblong figure, which is very different from the semi-circular shape of the milk teeth. The incisors, however, are not of equal length in all horses, and in some the gum may be so prominent as to give the permanent somewhat the appearance of a temporary incisor; other indications, however, even then, enable the different nature of each to be with certainty distinguished. The enamel is only partially exposed in the horse tooth; the shaded portion of *Figure 1*, in the preceding wood-cut, denotes the extent to which it is generally covered during the period of dentition; and when the teeth first appear, the enamel is wholly concealed by a covering of crusta petrosa. That covering is never entirely removed—a small portion of it, even in the oldest mouths, is seen near to the gums. It looks like an accumulation of tartar, and is most conspicuous in the tooth that has been newly cut. The presence or absence of this substance, therefore, should be noted, and moreover, the enamel surface should be further inspected. The numerous channels that give so peculiar a fluted appearance to the milk tooth, are not to be seen upon that of a permanent description;

but in the stead are to be detected only one or two broad grooves, which extend the entire length of the crown. *Figure 1*, at page 48, indicates the shape and direction of the grooves upon the surface of the permanent tooth, though probably a better idea of them is to be derived from an inspection of the coloured engravings, in which they are more prominently exhibited. By means of such guides, the opinion is rendered positive, and the inspection of the table is hardly needed to confirm it ; but the table affords corroborative evidence, which may be of service. The table is broader, and the infundibulum is deeper. In this latter cavity, food accumulates in the permanent, but rarely in the temporary incisor. The gum may so contract as to give to the tooth some appearance of possessing a neck, but in reality no such part is developed in the horse incisors, as will be seen by referring to the previous cut, which may, with profit, be compared with the coloured engravings, which depict these members as they are exhibited in the mouth of the living animal.

27. *The temporary cannot be well distinguished from the permanent molars, while the horse is alive.*

It is true that the table of the first is somewhat narrower than, though of equal length, with that of the last ; but the difference is not so marked as to justify an opinion being pronounced upon the imperfect inspection which, under the most favourable circumstances, can be made of these organs. The number of the molars may, however, be counted, and from this the age of the animal deduced with correctness. The operation can be at all times performed, and the fact ascertained. When, however, removed from the jaw, the character of the molar is easily recognized, for the difference in the length and shape of the fang renders it then impossible to confound the temporary with the permanent tooth.

28. *The various points which denote youth* must now be noticed. The remarks on this subject, however, must be confined to the mouth, to which this treatise is devoted. In the foal, the membrane of the mouth is of a delicate pink colour, suggestive of its high vascularity. The gums are prominent, for as the permanent are cut posteriorly to the milk incisors, and the germs of the horse teeth are developed even at the time of birth, the anterior part of the jaw is

pushed forward to make room for their growth. This gives the little animal somewhat the appearance of being parrot-mouthed, as will be observed by referring to the coloured plate of nine months. Then the palate is low in its position, and the bars appear almost on a level with the tables of the upper teeth, and may even descend beyond them. The lower jaw, also, if felt, will be found to be quite round ; and the face, if observed at that part under which the molar teeth are situated, will seem full, or the cheek will look a little blown out. These last signs, more or less, remain till the process of dentition is completed.

29. *The indications of age* are no less deserving of notice. The edges of the lower jaw become sharp, and ultimately retracted ; the cheeks grow flat ; the membrane of the mouth loses its vascularity, and puts on a dull yellowish colour ; the gums look hard, and the front of the jaw becomes narrower, while at the same time it inclines more backward, causing the teeth to project horizontally. The inclination which age gives to the teeth, will be easily perceived by comparing the coloured engravings with each other ; and the peculiarity of the upper and lower

incisors not being perceptible at the same time in the mouth of a thirty-years old, entirely springs from the acuteness of the angle which they form at that period. The bars, as years accumulate, also change their positions, being drawn upwards. From the space between the corner incisors and the first molars, the tongue on either side protrudes, as if the narrowed cavity left not sufficient room for the organ to repose in. The extent to which the tongue will project may be conjectured, by regarding the representation of it given in the coloured plate of the thirty-year old mouth. At that age, the protrusion is too strongly marked to escape the observation of any one whose attention has once been directed to the circumstance. Accompanying the inability to retain the tongue within the jaws, is a constant flow of saliva, which continually falls from the mouth of the old horse when the lips be held apart. The latter fact, the author, when he made the drawings for the present work, had ample experience of, as in some instances it occasioned serious delay.

30. *The incisor teeth, in old age,* have their characteristic signs. Mostly they appear unnaturally

long, though in rare instances they are worn down almost to the gums. When long, they will generally show interstices dividing them, such interstices, however, not being free, but occupied by a compact mass of foreign matter, derived from the food, and having a black colour. The reader will, by turning to the coloured plates of twenty and thirty years, see these accumulations indicated. When the incisors are very short, they are arranged in a different order to those of the young animal. The tables of the teeth of the young horse, form almost a semi-circle; in the adult animal, they gradually assume a crescentic order, and as age progresses, they ultimately range, more or less, in a straight line. The teeth also look narrower as the fangs descend with the wear of the organs, and in colour they slightly change. The enamel loses much of its semi-opaque and characteristic appearance, assuming a more dull aspect, and a yellowish tint. The *crusta petrosa* is to be seen only near to the gums, and within the grooves, which often are deep and very well defined, and within which the remains of the once-investing membrane becomes almost black. Then again, the tables themselves change their shape as the years increase. At first, these surfaces are of

an oblong and somewhat oval figure ; by degrees, however, they become angular, and ultimately more or less square. The continental authors have been very minute, and not a little profuse upon the changes of form which the tables undergo, and attribute the alteration to the gradual wear of the teeth. The correctness of this view they endeavour to establish by sawing a tooth through at various places, and attempting to show, that the forms of the surfaces exposed by this process correspond to the shapes assumed by the table during the progress of age. Their deductions can, in the study, be made to appear true, but in the stable will not bear the absolute application to which these writers would put them. By means of this test, Pessina asserted he would tell the age of a horse, accurately, up to the twenty-second year. The Girards acknowledge the tables will not guide them so far, but nevertheless are willing to apply them during the first seventeen years of the animal's life. I leave the reader to form his own opinion of the value of such speculations—for while I confess they are of some worth as guides to the primary study, and helps to the proper understanding of the cause of those changes of figure to be antici-

pated—I am not satisfied that any rule drawn from them can be depended upon. For that reason I shall hereafter present the reader with figures of the tables taken from authenticated mouths, rather than amuse him with speculations, which, however imposing they may seem to the ignorant, practice soon discovers to be no more than remote and plausible possibilities.

31. *Some judges depend upon the tushes as indicative of the age, and taken in conjunction with the other parts they afford corroborative evidence; singly, however, they should not be relied upon, nor should too much weight at any time be placed upon their appearance.* In the first place, the tushes are cut irregularly; they may appear in the mouth between the second and third, and they may not pierce the gums so late even as the eighth year; the periods named being of course the extremes. As a general rule, however, they come up between the fourth and fifth year. The custom, however, which Nature so frequently disregards, can afford no positive guide to the judgment, and the wear which may begin thus early or late, should not be too particularly insisted upon. The tushes when they first show are

shaped somewhat like a spear head, smooth and rounded on their external surfaces, but grooved on the side which touches the tongue, pointed at their extremities, and sharp at their edges. The inclination of the young tush is oblique, standing forward, and the situation is comparatively near to the incisors. As the animal's age advances, the tushes retract, the grooves on the inner surfaces wear out, and the space which separates them from the incisors increases: all observations, however, concerning the tushes, must be accepted with much allowance, for these teeth are very irregular. As a general rule, the lower tush becomes blunt, or rounded at its point and edges, and also of considerable length, while the upper is often so diminished as to be worn almost to the level of the gum. In stallions, kept only for service, the lower tush, however, frequently attains a great length, presenting the appearance depicted in the coloured engravings of the mouths at twelve and sixteen years. In those plates, the reader will observe the tushes no longer point in a forward direction, but have a decided inclination outward, and somewhat backward also. Another indication of extreme age is also worthy of

notice, although, if too absolutely relied upon, it may occasionally mislead. Tartar, not generally found in any quantity upon the other teeth in the horse, accumulates around the tush, and in very old animals almost conceals it. This excessive deposit I have rarely observed in horses of moderate age.

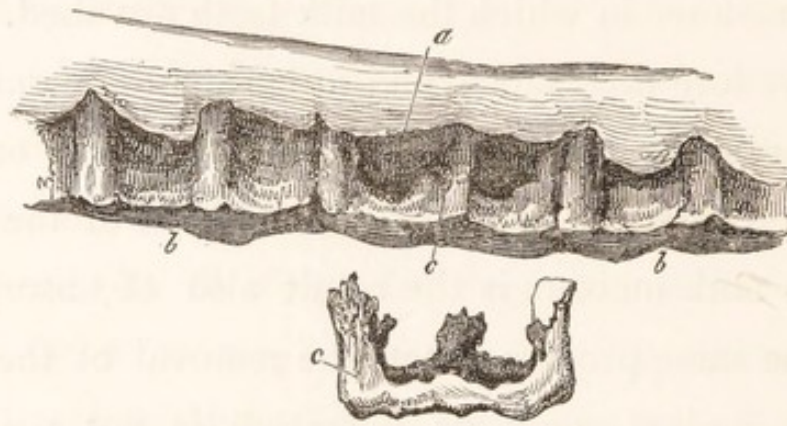
32. *The wolf's teeth or eye teeth aid us in judging of the age*; though we are bound to state of these that they can be received only as presumptive evidence. The wolf's teeth have not been before alluded to, because they are not concerned in mastication, and are no more than the representatives of those organs which form the continuous chain in the mouths of some other animals. These teeth appear to be of no use to the horse. They are little nodules of tooth-like structure, having minute fangs, which are inserted immediately anterior to the first molars of the upper, being rarely seen in the lower jaw, and when present there, always being even yet more diminutive. These wolf's teeth are generally shed with the first temporary molars, and therefore if they can be seen, it may be assumed that the permanent molars have not began to appear. The assumption, how-

ever, must not be converted into an assertion ; for in some instances the wolf's teeth are retained, and, in a few heads, will remain after the horse has reached an age far beyond that of colthood : their presence, therefore, rather leads our expectations than confirms our judgment.

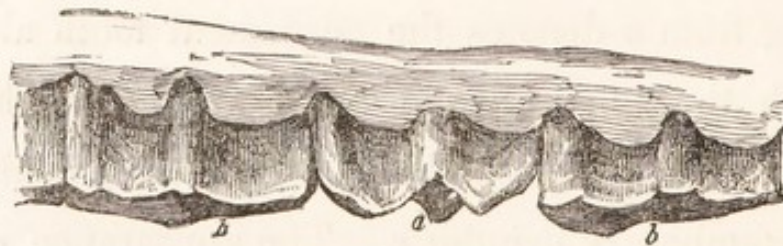
33. *The mode in which the horse cuts his teeth* remains to be pointed out. It is generally said, that the tooth, originally growing in its circumscribed cavity, pushes its way through the parts which oppose its entrance into the mouth. So mechanical an idea is characterized by a small amount of physiological knowledge, and it is time the notions which attributed development to mere force were discarded. The tooth is first a pulpy mass, very soft and highly vascular ; the superior part, or that part which primarily shows itself above the gum, is the first to become consolidated. Enamel and ivory are there simultaneously deposited, and gradually these extend towards the fang. When a portion of the fang is completed, and the time has arrived for the tooth to be cut, those structures which oppose the egress of the tooth are absorbed ; the absorption taking place,

not only on the internal surface, against which the young tooth has been supposed to exert its force, but also upon the external parts, upon which it could have no effect. By absorption the barrier is removed and the tooth then comes forward. The process is very beautiful, and no less worthy of admiration is the manner in which the milk teeth are shed. The incisors lose their fangs, and just when the permanent teeth appear, the crown of the temporary ones is removed from the mouth. The removal of the fangs of the milk incisors is the result also of absorption, and the same process effects the removal of the temporary molars, only its operation is not precisely similar; for in these last, not only the fang but the greater portion of the crown is taken away, and little more than the table is cast off when the remnant of what once was a tooth is at length shed. The process of cutting the molar teeth will be more clearly comprehended by referring to the annexed wood-cut, in which the darkened spots indicated by the line running from *a* denotes the permanent tooth already through the gum and in the mouth, though still covered and partially concealed by the retained table of the temporary grinder *c*. The appearance of the

table of the temporary molar when cast off is shown in the figure immediately underneath, to which the letter *c* is also affixed, and the projecting portions ascending from its edges exhibit the last remnants of what originally was the fang: *b b* are molars, well up and worn to a level.



The next wood-cut exhibits the molar *a*, immediately after it has lost its covering. At this time the table is very uneven, presenting points which the finger would readily recognize, but in a short time these wear off, and an even surface is obtained, rendering it level with the other teeth, *b b*.



As is here seen, when the crown has been removed, the permanent molar is well up, although it occupies the same place, and fills the same alveolar cavity which the temporary molar originally held. The horse incisors do not occupy the same cavities in which the milk incisors were placed, but are developed in cells formed especially for their reception, and come up rather behind than absolutely under the primary teeth. The form of the anterior part of the jaw in the foal admits of such an arrangement, and its greater comparative bulk gives all the space that was required. The space, however, between the branches of the lower jaw where the molars are developed, is filled by important muscles; and while any thickening externally would deteriorate from the symmetry of the head, any internal enlargement would have interfered with the free motion of the tongue and hyoideal appendages, the movements of both being as essential to perfect mastication as the presence of the teeth themselves. Hence the grinders are in their development regulated by a different law to the incisors; nor is the ordinization which declared the first should be well up, and the last scarcely to be seen when the period for casting off the tempo-

rary teeth arrived, to be passed over in silence. The molars are more important to the welfare of the animal than the incisors can be supposed to be. If the front teeth are irregular, the horse, nevertheless, can manage to feed ; and if some are even wanting, the animal can subsist. A few would serve to grasp a sufficiency of food, especially such food as the state of the mouth, during the period of dentition, would dispose the colt to partake of. The animal is then in an inflammatory condition — the system is excited — and it is a wise provision which leaves the creature inclined only, at such a time, to consume a soft and laxative herbage, not in too great a quantity. The molars, on the contrary, if irregular in their growth, or uneven upon their surfaces for any lengthened period, would produce great local pain, and much constitutional disturbance. The food, in consequence of the rugged condition of these teeth, would be imperfectly masticated, the organs of digestion would become impaired, and the whole frame would suffer. To prevent this, the molars are fully cut before the temporary tables are cast off, nor do both the tables leave the mouth at the same time. The one on the upper jaw is first shed, and it is not until

this has, by attrition, been rendered somewhat flat, so as to present a surface upon, or against which the food can be ground that the permanent molar of the lower jaw is uncovered. The unevenness of the grinding agent becomes now of less moment, since the part over which it is to be moved has been rendered fit for its uses, and since there are other teeth that present all their surfaces, suited for the purposes of mastication.

34. *The manner of examining the teeth* is simple enough, and yet a few remarks may as well be made upon this part of the subject. To see the incisors, all that is necessary is to part the lips; but many horses are naturally shy when their mouths are touched, and more are rendered so by unnecessary severity in the administration of medicine, or by the tricks to which they may have been subjected. A certain degree of caution is always needed when an animal is strange to the examiner. Where the horse shows a disposition to resist, the groom who attends upon it, if present, should be allowed to handle the mouth, the judge being content to look and form his opinion from what he sees. If the

groom be not in the way and the horse seems nervous, let the neck be patted, the face below the eye gently rubbed, then the nose caressed; and when the timid animal is assured that no harm is intended, the lips may be freely drawn asunder: but should the head be snatched away, when the first attempt to see the teeth is made, let the hand immediately release the mouth, rather than endeavour to retain the hold. It is far better to begin again than justify the fears of the horse, by a needless and worse than useless struggle, which in the end will probably be of no avail. After the horse has by forbearance been rendered quiet, while the lips are held asunder, the *shape, colour, length, and obliquity* of the teeth are noted, and the presence or absence of milk teeth observed. When this is done without violence, the animal will not often offer any opposition to the finger being introduced to feel the tushes, or to the sides of the mouth being separated so as to obtain a fair view of them. The examiner now places himself in front of the horse, and by introducing one finger behind the incisors and getting it under the tongue, will cause the animal to open its mouth, or the tongue may be seized and drawn out of the

mouth; and if confidence is established, no opposition will be offered to the jaws being kept for a short time apart. Of this, advantage is taken to observe the arrangement of the teeth, to inspect the tables, and to note the shape or depth of the infundibula. When all this has been accomplished, in less time perhaps than it takes to read a description of the process, the business is generally finished, and a conclusion has been arrived at that amounts to positive conviction. On certain occasions, however, it may be desirable to inspect the molars; and to do this properly requires a little tact. Some persons cast the horse for this slight operation: indeed, there are people who throw horses as though they imagined nothing could be done without the hobbles. There is, however, generally no occasion for such a proceeding; the twitch in the great majority of cases is all that is needed, and, with a little patience, even that instrument of torture may be dispensed with. A stool, or if nothing better is at hand, the stable pail is fetched for the operator to stand upon, so as to look with ease into the mouth of the elevated head. The animal is led into a good light, the balling iron placed between its jaws to keep them

asunder, the tongue being drawn out to the side, removed from that which it is desired to inspect. While the mouth is thus distended, the person who is to judge, mounts the stool or pail, and looks into it till he is satisfied. Should the operator be desirous of feeling the teeth, he descends from his rostrum, and having pulled off his coat and bared his arm, introduces it into the mouth, while the tongue is drawn to one side by the assistant who holds the iron; always, however, taking care if possible, to have a balling iron which is open on one side, the arm being so introduced that the elbow is towards the free space. Should this precaution be neglected, if the horse prove suddenly restive, an accident may ensue. The lower jaw being easiest felt, and the teeth therein situated being most readily counted, that is the part generally manipulated. This is not difficult unless made so, and often rendered dangerous by the intemperance of the party who undertakes to accomplish it. Having described it, the author will now proceed to state the times at which the different teeth appear, and the signs which they exhibit.

35. *At birth* the foal has usually three molar teeth on either side of each jaw,* and perhaps two front incisors, which last are then lateral in situation, and appear to be very large in proportion to the age of the animal. It is, however, usually a fortnight or three weeks after birth before the incisors appear. I have to acknowledge the greatest obligations to the Messrs. Tattersall, for the valuable opportunities afforded me of inspecting blood stock, at their large and admirably-conducted establishment at Willesden Paddocks.

36. *At six weeks*, two more incisors are generally cut in either jaw, and those which originally seemed to grow from the sides, have, by this time, taken a position more directly in the front of the mouth.

37. *At six months*, the incisors have moved almost into the situation they will hereafter occupy, and the jaw appears somewhat elongated; but, if the gums

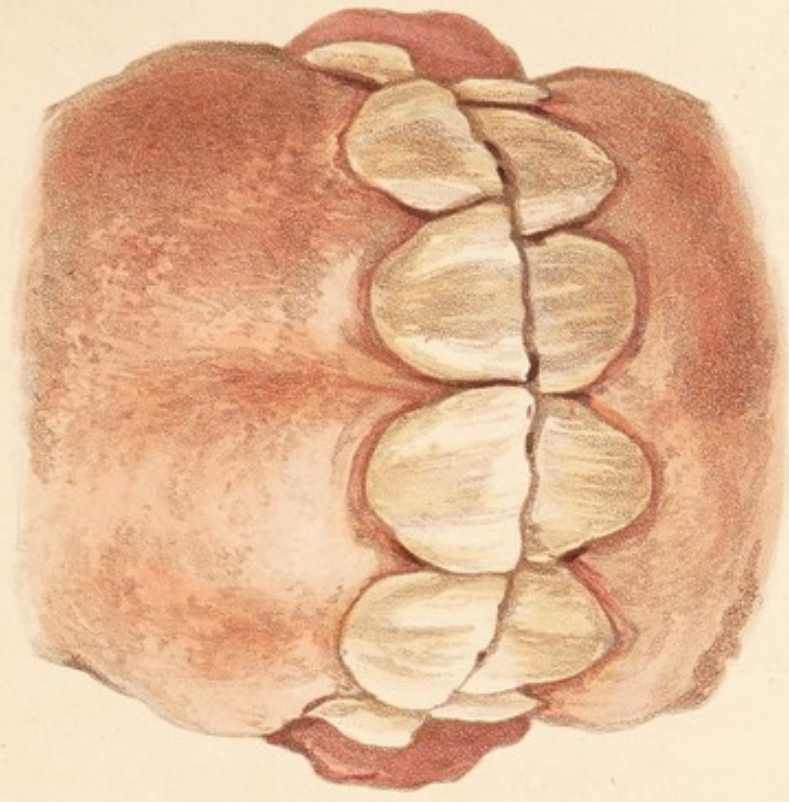
* The wolf's teeth at the anterior of the two rows of upper molars are generally present or indicated at birth; but as they are not invariably found, and are by no means to be depended upon as significant of the age, no direct notice need be taken of their existence.

be observed, it will be seen that nature is preparing to cut the corner milk teeth, which may even be through the gum.

38. *At nine months old, the corner milk teeth are up, but their edges do not yet meet.* The coloured engraving will show the appearance they present, and likewise exhibit the protruded state of the gums at this age. The drawing was made from a head in the author's possession. It has been tested several times, and its correctness fully ascertained. The last occasion, when it was authenticated, was by the mouth of a bay colt, by Muley Moloch, out of Canaletti's dam, with which it perfectly agreed.

39. *At one year, all the temporary teeth are up and in apposition; but by this time two pairs of permanent teeth, which are the fourth molars, have made their appearance, and the yearling therefore has sixteen molars and twelve incisors, or twenty-eight teeth.* The large number of yearlings annually brought into the market afford such frequent opportunities of examining the mouth at this age, that I need not state here the means by which the drawing

TWO YEARS OLD.



*A full Mouth of Milk Incisors,
all of which show considerable wear.*

NINE MONTHS OLD.



*The Corner Milk-teeth up - but
their edges do not yet meet.*

has been authenticated. It would be a task of supererrogation to allude further to a fact which is so well known and thoroughly established.

40. *At eighteen months*, the incisors show some wear, the infundibula look as if they would soon be obliterated ; indeed some of them may be lost. At or about this time also four more permanent molars, one on each side of either jaw, being the fifth in situation, protrude into the mouth.

41. *At two years old*, there is a full mouth of milk incisors, all of which show considerable wear. The coloured engraving of the two-year old mouth, will convey an accurate idea of the features which it presents at that age. The original drawing was made for the Jockey Club in anticipation of the celebrated Running Rein trial. Accepted by such authority, it perhaps hardly requires further proof of its correctness, but it has since been repeatedly tested. On the last occasion it was compared with the mouth of a chesnut filly, by Calmuck out of Miss Greatrex, and was found to agree with the indication therein presented. At two years, the infundibula are lost in the

temporary incisors, and the fifth molars are in perfect apposition ; indeed the smooth surfaces of these last are the best evidence that the animal is two years old, for he cannot then be far below that age. The incisors having been for some time employed, but still being to be retained for some months, have an aspect of wear and strength conjoined. The two-year old mouth, therefore, by those who cannot distinguish the milk from the horse teeth, (none of the latter being present to help the judgment by the contrast they exhibit) is likely to be mistaken for that of a five-year old ; especially if the colt chances to be somewhat fully developed. A regular horseman, however, would not require the aid of the mouth to discover the animal was still in its colthood.

42. *At three years old, the centre horse teeth are well up, and are distinguished by their size, shape, and colour.* The appearance which the mouth will exhibit, the coloured engraving represents. The original drawing is in the possession of the Jockey Club, for whom it was made. It has, however, been repeatedly tested, in order to place its correctness beyond doubt. Both colts and fillies have been

inspected for this purpose, and equally have the different breeds been consulted. As the public, however, place the greater confidence in blood stock, it may here be mentioned that the appearances perfectly coincided with those exhibited by a brown colt by Muley Moloch out of Miss Greatrex, and Roxey, a brown filly, by Lanercost, out of Ellen Percy, besides various others which it would be both needless and tedious to recapitulate. The mouth, at this period, indeed is so marked, and in general so regular, that it is the more readily recognized. The new horse incisors, by their size, contrast with the milk teeth which are still retained. The comparative length and squareness of their figure cannot fail to attract attention, and their deeper colour can hardly be unobserved ; that colour is caused by much of the primitive coating of *crusta petrosa* being retained, or only removed from the edges where the enamel is bright. But as a vast number of horses are sold at this age, and many are started for heavy stakes, it will be imperative now to proceed more cautiously in the description. About this time the terms "rising three," or "coming three," or "three next birth-day," are made use of, as well as "three

off"—the first phrases indicating that the colt is yet between its second and third year, or will in a month or more be three years old, and the last term meaning that the animal has attained its third year, and has recently entered the fourth year of its existence. The season here materially aids the judgment; for if a blood horse shows a fair three-year old mouth in December, it is unhesitatingly pronounced to be "coming three;" and if it exhibits the same appearance in January the animal is declared to be "three off." The same holds good with the coarser breeds, only, as before stated, the month of April would then be estimated as that of December in the former case, and May would answer to January. "Coming three," however, can, with a little stretching of the term, be applied to any foal; and is commonly used when the colt is strictly but "two off;" for the terms are somewhat loosely used, though in their stringent sense a horse is only rising three, four, or five, after the mouth has begun to assume the form which characterizes the respective ages. When the colt is two off, that is two years and three months old, the milk teeth are all retained, and to a casual observer, the mouth would still say "two." A little

closer observation will, however, correct the judgment, for looking attentively, perhaps a slight, and only a slight difference in the colour of the central incisors may be remarked. The tinting of the enamel may be a "thought" darker, and yet the contrast so delicate, that the difference can only be seen in a certain light. Then again casting the eye to the gums of the upper central incisors which are first shed, that part of them immediately covering the neck of one of these teeth may show a little redness, and the other exhibit nothing of the kind. The redness indicates that nature is making ready for the appearance of the permanent incisors, and on evidence no heavier than this, the animal is pronounced to be "two off." The redness, it may be said, can be artificially produced—so it may be, but the natural character can hardly be imitated. The colour in the normal mouth is not deep or angry; it is not caused by inflammation, but is only increased vascularity of the part, and it is at first limited to the edge of the gum. The colt shows no symptoms of tenderness in the reddened gum, but stands quite as still, and even more quiet when it is pressed, than when the opposite one is handled. If the part had

been tampered with, the animal would probably tell tales when the finger touched it, and the redness would be more intense on the prominent or bulging portion of the gum than where the margin encircles the neck of the tooth; while it is ten to one inflammation had been produced rather than vascularity excited. Little occasion, therefore, is there to fear imposition, and little room for those who would practise it to hope for success. The next indication of advancing age is given by the gums growing more vascular, even now looking inflamed, while a yellow deposit (the nature of which is not well understood) may be seen upon the neck of the tooth, and the central incisors of the upper jaw, if felt, may probably be found loose. In another or about the sixth month, one of the central incisors is removed. It does not fall out, as is generally stated, but while the animal is feeding, the tooth is, as by accident, wrenched off. The gum bleeds, and being slightly lacerated, looks sore and angry for some time. The sharp edge of the new brown-coated permanent incisor is now seen protruding. In a week or two the remaining milk central incisor of the upper jaw is, by a seeming accident, forced out; and the mouth now

has an irregular appearance, the edges of the upper central incisors not being level with the tables of the lateral milk teeth. The lower central incisors, when the upper milk teeth are lost, generally are loose, and their gums inflamed ; but a month or sometimes six weeks may elapse before these are gone : by that time the upper permanent teeth have grown considerably. When the central milk incisors have disappeared, the molars begin to change, and those of the upper jaw are the first uncovered ; not in any regular order, or the two teeth on the same day, but generally the first molar before the second, the wolf's teeth mostly departing at the same time. A week or two subsequent, the first two permanent molars of the lower jaw are laid bare, so that at or about the ninth month, the horse has all those teeth, which denote the animal to be three years old, fairly in the mouth ; that is, he has between the second and third year cut four horse incisors and eight permanent molars. Lest the description should not be perfectly clear, or such as to enable the reader to readily understand which teeth by this time are shed, a drawing of the head of an adult animal, which forms the frontispiece of this work, was designed. It will enable the reader

to form some notion of the extent of the horse's mouth and likewise of the positions of the teeth. Near to the teeth will be seen figures which do not denote the periods when these organs first appear, but the time at which they are fairly up, or to some extent exhibit wear. In that engraving no further notice is taken of the milk teeth than is conveyed by the small star associated with such of the figures as indicate the places from which they have been displaced : thus the figures 1, 2, and the last 4, having no star, indicate that those molars are developed only as permanent teeth. The figures 3*, 3*, 3*, having stars, denote that milk teeth originally occupied the situations where these teeth are shown : those figures will be seen above and below the central incisors and the first two molars of either jaw ; and as but one side of the face could be displayed, of course the number has to be doubled, the colt getting twelve additional permanent teeth by the time it completes the third year. At three years, therefore, the central permanent nippers are in apposition, and show wear, though to only a limited extent. The infundibulum is broad, as depicted in the accompanying cut.



In the above representation of the table of a three year old tooth, it will be remarked that the infundibulum appears in the outward direction to extend quite across the surface. This aspect is produced by an indentation at that part, which, by the completion of the third year, is in most instances not worn out, but after the third year is attained, it speedily disappears; so the table of the three year off has become somewhat broader, and the infundibulum circumscribed, or well defined, as it is shown in the subjoined wood-cut.

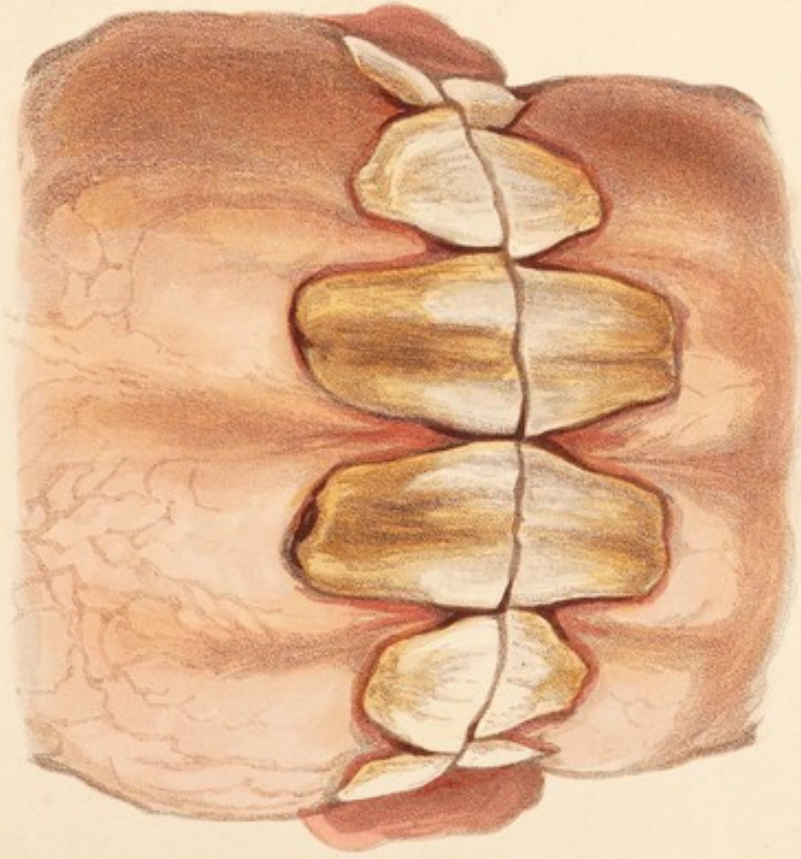


In fact, the shape of the table is here the best guide, and should be carefully studied, as otherwise the judgment can never be assured. At this age, one tush may be peeping through. I have never seen more than one present at three years, and then these teeth have always been slightly developed, rather indicating what was to grow than exhibiting that which

had actually grown. The tushes, however, now in almost every case, may be felt under the membrane through which they are ultimately to protrude, and can most readily be felt in the upper jaw. Nevertheless, the tushes of the lower jaw always make their appearance first, because the membrane covering these is less loose, and therefore more easily penetrated; and also because the lower jaw being the active agent of mastication, as well as the resting place for the bit, it is naturally subjected to greater wear, thereby assisting the egress of the tushes. In the upper jaw they are often concealed by the loose membrane long after they are fully developed. The tushes, at this age, however, are no guides. The three year old colt, for general purposes, is easily recognized, when the lips only are separated.

43. *At three years off, the lateral milk teeth are shed, and the permanent teeth are coming up.* The coloured engraving, the original of which is also the property of the Jockey Club, for whom it was executed, was made from the mouth of a bay gelding, by Almack, out of a mare by Rubens, Jun., belonging to — Goring, Esq. The state of the mouth therein

THREE YEARS OLD.



The Centre Horse Teeth well up and distinguished by size, shape, and Colour.

THREE YEARS OFF.



One of the lateral Milk-teeth shed, and the permanent Tooth coming up.

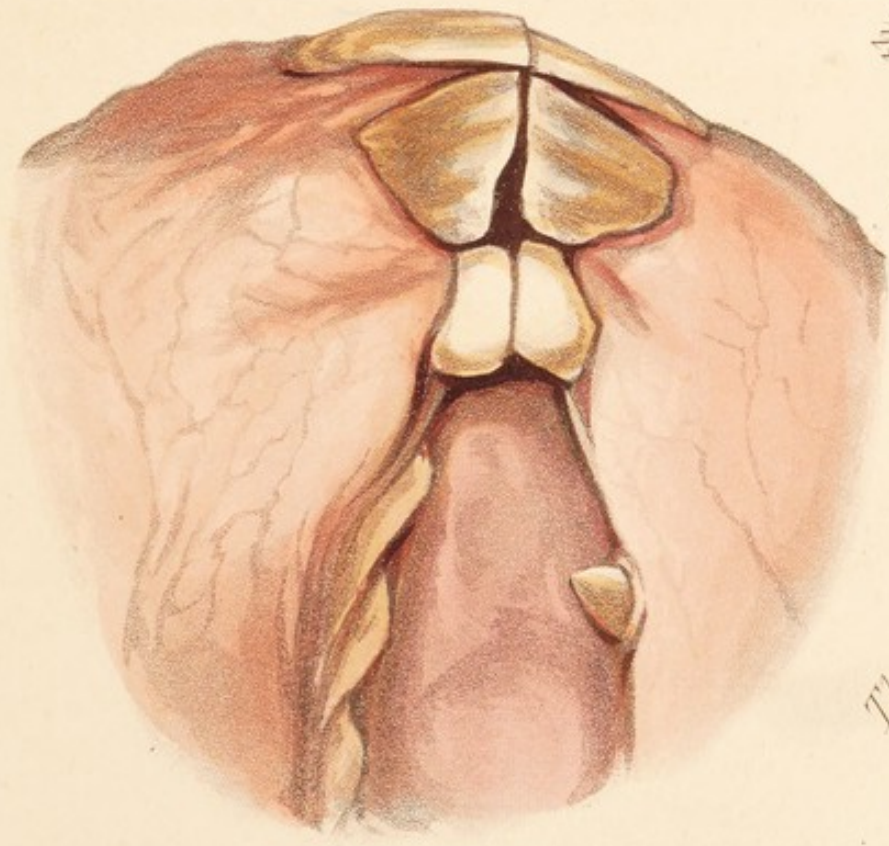
exhibited is so peculiar to the age, and so decided in its indications, that it can hardly be mistaken. One of the lateral milk teeth from the lower jaw has been recently lost. The gum is sore, and the top of the permanent incisor is seen rising up. By comparing the temporary incisor, which is speedily to fall from the upper jaw, with those representations of the same teeth given in the previous plates, the gum will be observed to have considerably retracted. Preparation is evidently being made for the change which will in a few weeks take place. The milk teeth begin to be shed about the seventh or eighth month after the completion of the third year, those in the lower jaw being the first to quit the mouth; and all that was observed on the subject in the former paragraph, may be applied to the present, only making allowance for the differences of position in the teeth.

44. *When rising four years old the lateral horse teeth are in the mouth, but their edges do not fairly meet.* The coloured engraving of this age will denote the altered aspect of the mouth, consequent upon the development of a few months, when the colt may want only a dozen weeks for the completion

of its fourth year. The original sketch for this plate was taken from the mouth of a horse called the General, the property of Sir Samuel Spry. To test it, however, it has been largely applied, and in every case it has been confirmed. If the mention of names is here required, I may repeat those of Blackbird, Marquiss of Conyngham, and a host of others. The plate, therefore, may be regarded as fully established, and the reader, without fear, may depend upon its correctness. As is shown in the engraving, the lateral incisors, at this age, touch, but nevertheless do not meet so as to be of any service in nipping the food. It is of some importance to attend to this peculiarity, inasmuch as were the presence of the indicative teeth alone remarked, an animal wanting some months to be four years old might be purchased for one that was rising five.

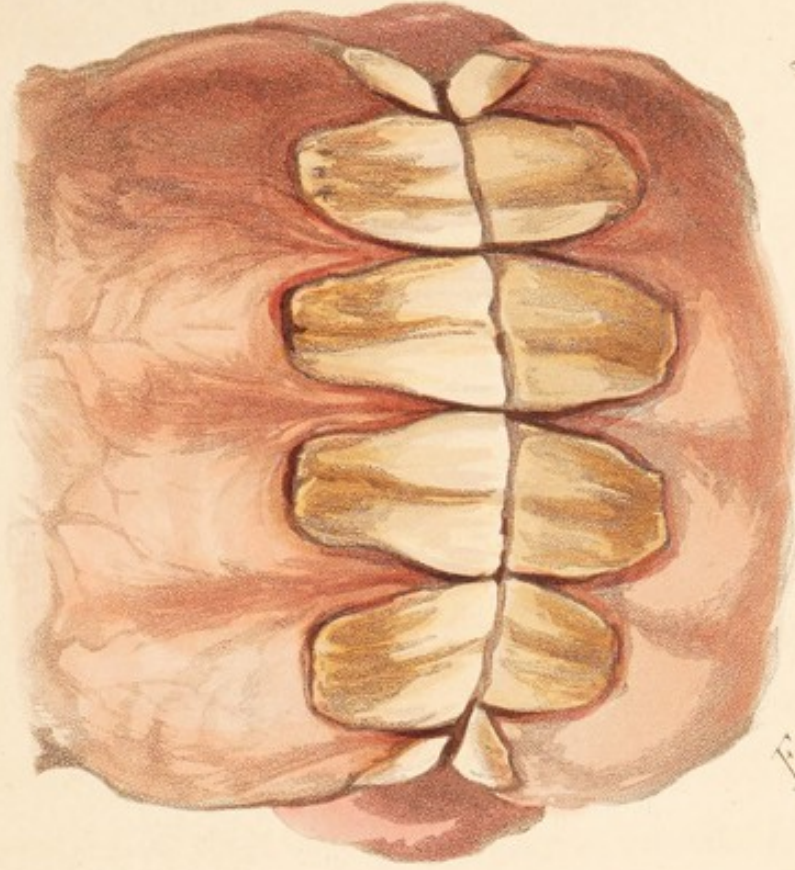
45. *At four years, four pairs of horse teeth are well up, but the corner milk teeth are retained.* Such a state of the mouth is very characteristic of the age, and not likely to be mistaken. The appearance which the teeth present, if viewed from the front when the lips are separated, is

RISING FOUR YEARS.



*The lateral Horse Teeth in the Mouth.
but their edges not fairly meeting.*

FOUR YEARS OLD.



*Four pairs of Horse Teeth well up.
but the Corner Milk teeth retained.*

shown in the coloured engraving, and it is such as no person can well mistake. The original drawing in this case was also made for the Jockey Club, and was produced upon the famous trial. On all occasions that presented themselves, which have indeed been numerous, it has been compared with the mouths of living animals, and in no single instance has it been found to be contradicted. This has not only been done with colts, but also with fillies, among which last I may mention Lupine, Mora, Nightcap, Chamois, and Jew Girl. To the plate, therefore, the reader should refer; and supposing him to have done so, the other indications which the mouth presents between the third and fourth year will now be enlarged upon. The state of the molars at this period may be regarded as demonstrative of the age of the animal. The reader will remember, that according to what has been pointed out, the colt at three years old has five molar teeth on either side of both jaws, and that of these teeth, one only, the third in situation, marked thus, 4* in the frontispiece, is of a temporary nature. Shortly after the upper lateral milk incisors have been cast off, and sometimes previous to that occurrence, the point of the sixth molar

penetrates through the gum, and before it is fully up the covering of the third permanent molar is removed. This effected, the colt has six molars on either side of both jaws, and whenever that number is found they may be assumed to be all of a permanent character; so at four years old the tables of the central incisors exhibit some considerable wear, the infundibula no longer extend entirely across, but have become circumscribed and well defined. The tables of the lateral incisors, on the contrary, are only beginning to be formed, and very often the part posterior to the infundibulum has not received any attrition. The infundibula in these last extend the entire breadth of the table, and in consequence of an indentation on that side which touches the corner milk teeth, the space is there free. The reader will comprehend this particular formation, by referring to the wood-cut of the table of the tooth presented at page 79, the appearance being so much alike as not to necessitate a repetition to enforce it. When the fourth year, however, has been for a month or two perfected, the tables then assume the form represented in the following wood-cut, which exhibits the change that has taken place in the central incisor, and also

the appearance of the more recent lateral tooth when the colt is fairly four years off.



One or more of the tushes may also be well up: the whole may have made their appearance; but more frequently only the two originating from the lower jaw are through the gum. No dependence, however, can be placed on the presence or absence of the tushes, which repeated proof has shown to be irregular in their development: nor is the state of the mouth during the fourth year such as justifies an off-hand opinion being pronounced; for though during that period the growth of the teeth is generally well marked, nevertheless exceptions more frequently happen than between the second and third years. An instance illustrative of this fact occurred at the Veterinary College, at St. Pancras, during November, 1844. To that Institution was brought a dun colt, which the professors, one and all, pronounced to be "rising three." Mr. Robb, a gentleman of great talent, and then a pupil at the school, having looked at the animal's mouth, pronounced it

to be "three off," or "rising four." Here was a difference of opinion to the extent of a whole year ; and of course the pupil was sneered at for his ignorance and presumption. Mr. Robb, however, had reasons for his conviction ; he would not give up the point, but wrote to the breeder, and obtained a reply which showed the teachers had yet to learn. Being an acute observer, Mr. Robb had attended to the wear of the tables ; had seen the infundibula had become defined, and the surrounding surface broad. He had also remarked the gums, and seen that those of the lower jaw were slightly red ; and, taking these tokens in conjunction with the appearance of the colt, arrived at a conclusion which the result proved to be correct, and which did not show the mouth deficient in its symbols. Mr. Goodwin, veterinary surgeon to the Queen, has casts of mouths taken from horses of known ages. No gentleman connected with the veterinary profession, perhaps, has enjoyed such peculiar opportunities as Mr. Goodwin, and no one could be characterized by a greater inclination to take advantage of them. With a natural talent for observation, and an innate love for scientific inquiry, combined with enthusiasm in

the cause of truth, Mr. Goodwin has, in the midst of ill health, pursued his researches, and spite of an opposition, which did not stop short of calumny, fearlessly advanced his opinions. Those opinions, Mr. Goodwin's position, and his acknowledged ability should have claimed consideration for. The conclusions which had not been hastily arrived at, ought to have been deliberately weighed. The author of this work is proud to acknowledge the obligation under which the courtesy of Mr. Goodwin has placed him, and with pleasure confesses that he has, in that gentleman's society, learned much upon a subject which he had previously diligently studied to become the master of. The facts which Mr. Goodwin brings forward in support of his convictions, are strange and startling. The candour with which he courts investigation, enforces belief. He is certainly right in his own sphere; so far as his observations have extended, his conclusion cannot be overthrown. To the information he has generously afforded the author, allusion will repeatedly be made in the course of this work; but at present the remarks must be confined to the models in Mr. Goodwin's possession. One of these exhibits the

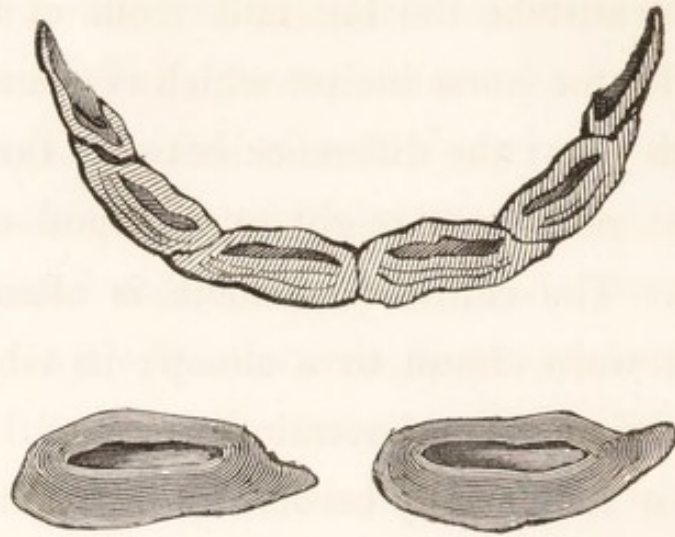
mouth of a colt called Julius, (which was ridden by Her Majesty) retaining the lateral milk incisors, when but a few days were wanting for the completion of the fourth year. The teeth that should have been shed, however, are evidently on the eve of leaving the jaw, and therefore though an exception, it is not so much so as to grossly mislead the judgment beyond a few months. It is to be regretted that the molars of this horse were not examined, and to the tables of the incisors, as shown in the model, I make no allusion, because these parts evidently have not received the particular attention of the artist, and consequently cannot be argued upon. The same gentleman has also favoured me with the inspection of a model of the teeth of a horse known to have wanted three months of the third year: nevertheless the mouth is that of a colt which would be pronounced to be "rising four." The lateral incisors on both sides, and in both jaws are fully up, and they possess tables, which, if correctly depicted, indicate that for some time they have been in apposition. A *lusus naturæ* of this sort is beyond the pale of reason. Connected with it there is no record of the development of the molars; and on

the state of the tables as shown in the cast, I am, for the causes before stated, not inclined to place any great reliance. The growth of the incisors shows the colt to be "rising four;" the evidence declares it only to be "coming three." Here is an exception to a general rule: one which I believe is unique; at all events I am aware of the existence of no similar specimen; and it is to be lamented that the growth of the incisors, from the earliest period, had not in this horse been observed. As a unique specimen it is curious, but as a premature and extraordinary development, it cannot be opposed to a general rule. Children have been born with three legs, or joined together at various parts; but the race of men are nevertheless described as having two inferior extremities, and as being independent in their existence. A solitary instance is no more than a curiosity, and, until it is proved to be the exemplification of a general rule, must not be made the basis of a general deduction. Such occurrences, however rare, nevertheless deserve consideration; and had the animal last alluded to been trained, there is no doubt any qualified judge would have pronounced it beyond the actual age. Therefore, gentlemen

possessed of racing studs, should, from time to time, have the mouths of their horses examined by approved members of the Royal College of Veterinary Surgeons, that any irregularity of development may be known and stated. To neglect so simple and reasonable a precaution, is to incur a needless hazard. By adopting it, the proprietor would be prepared to meet objection; and the idle reports that every year get into circulation would be quashed at their birth. A firmer basis for the authenticity of the age would be established than the reputation of the owner; and gentlemen would not annually be subjected to having their characters questioned by a host of interested ignoramuses. The turf is bound to adopt some measure of this kind for its own defence, especially as the honour of its members is, on every occasion, called into question, and a single instance of suspicion, seems, in the public eye, to warrant a general aspersion.

46. *When rising five years old all the horse teeth are in the mouth, but the corner teeth have yet to meet.* The peculiar sign of this particular age is the loss of the corner temporary incisors. It is scarcely

possible to mistake the last milk tooth of the four year old, for the horse incisor which is characteristic of the fifth year ; the difference between them is so great, that no person ought to confound one with the other. The corner milk tooth is often by the third year worn almost to a stump ; its table being somewhat triangular, or occasionally round. By the fourth year it generally becomes a mere stump, or so changed in appearance that it contrasts in size with the other nippers, and seems incapable of performing any active function. At first, the permanent tooth when it makes its appearance, strikes us by its greater breadth, the gum not then having sufficiently retracted, or the tooth sufficiently grown to allow its after length being estimated. When the corner teeth are in the mouth, some time will elapse before they touch, but the incisors are then arranged so as to represent almost a semi-circle. The annexed wood-cut will convey an idea of the manner in which they are placed, and also of the shape of the tables of the central and lateral nippers, at the time when the corner teeth do not approximate, although they are through the gums.



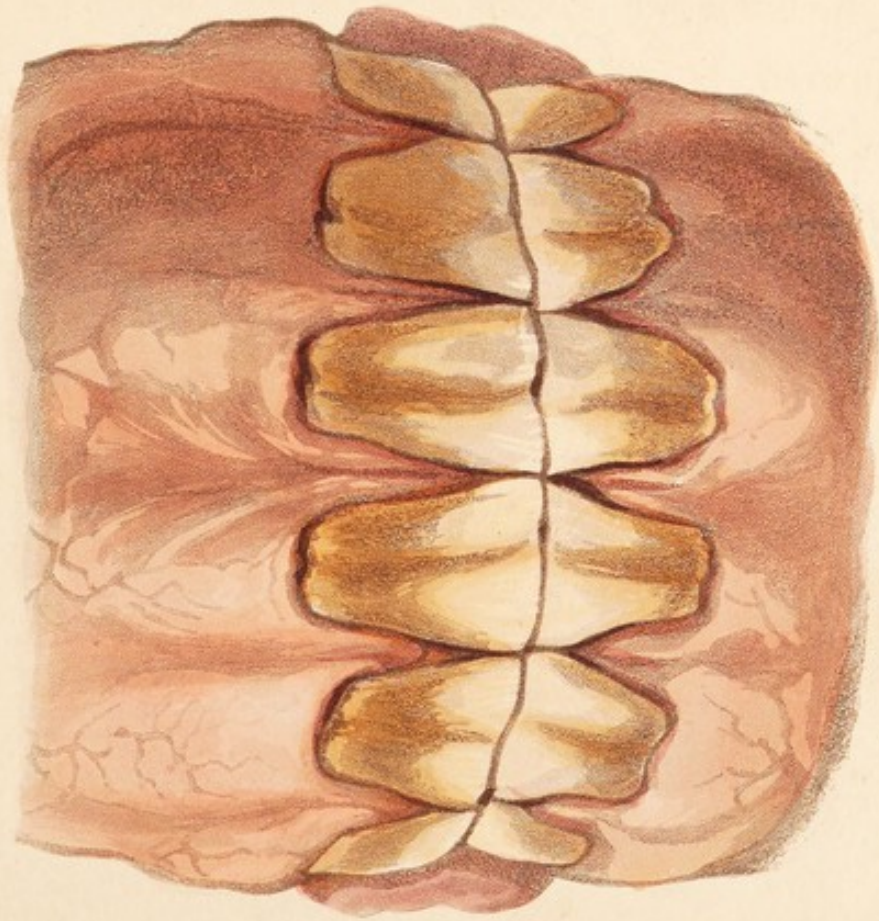
The periods when the teeth which characterize the fifth year make their appearance, must now be described. When the animal is four years and three months of age, the gums of the upper corner teeth begin to redden, and before it is three months older, one of the corner milk teeth may have been removed. The opposite milk tooth speedily follows, and then the corner horse incisors grow down, and seem almost to be fully developed before the corner milk teeth of the lower jaw are shed. When, however, all the milk teeth are lost, the corner incisors will not touch for some time ; and by the completion of the fifth year, though the teeth approximate, their tables are not formed, nor do their edges denote any

amount of attrition. The corner tooth at five years old, looks young, and is principally covered by the membranous crusta petrosa, which give to it a dark aspect, as though it were encrusted with tartar, little of the enamel being to be seen, while the shape of the gum is also characteristic. The five year old mouth, therefore, is easy of recognition, the shelly character of the corner teeth being very marked and not subject to much eccentricity in its figure. As five however, is the age when, for general purposes, the majority of high priced horses are brought into the market, the changes which take place before and after this period have been illustrated in the coloured engravings. When the animal is near to or rising five, the corner teeth are dark coloured, and though they touch, nevertheless their edges are not fairly together. The superior surfaces exhibit no tables, and the general aspect is such as is depicted in the engraving; the original of which was made from recollection of the appearances presented by the mouth of Mr. Payne's Rebel, which horse was seen at Hampton Court. The drawing was more recently corroborated and corrected by the mouth of a fine young black hunter, the property E. C. Crowley, Esq.

The peculiarities of this age, as denoted by the corner teeth not closing, should be remarked. It is not altogether unimportant to observe this circumstance, as animals are esteemed suitable for particular uses, only after the fifth year has been completed, and certainly all are less liable to disease when the mouth has been perfected. The distinction, therefore, is of some moment; and the better to enforce it, the reader will remember, that not until the accomplishment of the fifth year do the tables of the corner teeth begin to show: even at that time, however, they are very imperfect.

47. *At five years old there is a full mouth of horse incisors, all the edges of which fairly meet.* The coloured engraving—which has been amply proved, by comparing it with the mouths of horses of various breed, among which those of blood have not been forgotten, since it was last tested by the aspect presented by the teeth of the well-known horse, The Baron,—will instruct the reader in the altered character which the mouth now assumes. It looks more huge, and far more powerful than it did at the fourth year. The teeth fairly close,

FIVE YEARS OLD.



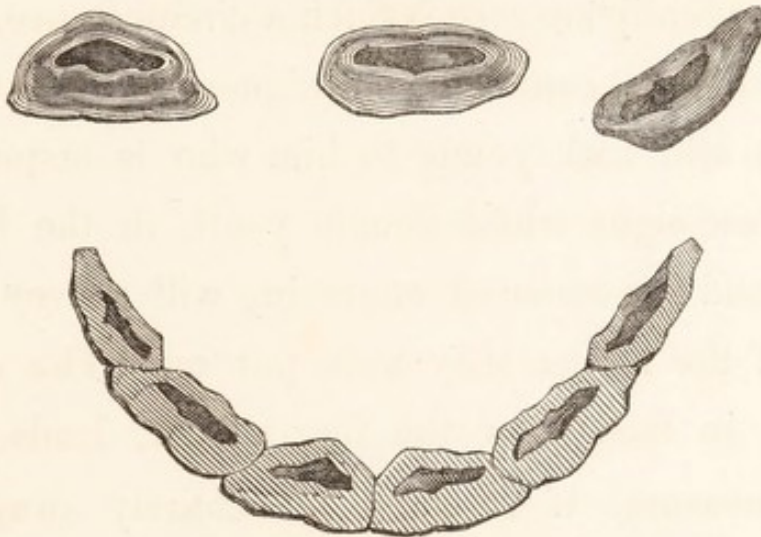
*A full Mouth of Horse Incisors,
all the edges of which fairly meet.*

RISING FIVE YEARS.



*All the Horse Teeth in the Mouth,
but the Corner Teeth have yet to meet.*

but on inspection there can be detected slight signs of wear. The tables are not yet formed. The anterior edges alone are rendered level; all posterior to the infundibulum being as yet untouched. The tables then present the appearance indicated in the following wood-cut, which also represents the semi-circular order in which they are arranged.



48. *At five years off the corner teeth only show slight wear, and the posterior margins are round. Much of the original coating of the crusta petrosa is retained, but in colour it may not at this time be dark. At those places where it has been recently worn down, it is often of a yellow tint, which is but a little deeper than the enamel, which last,*

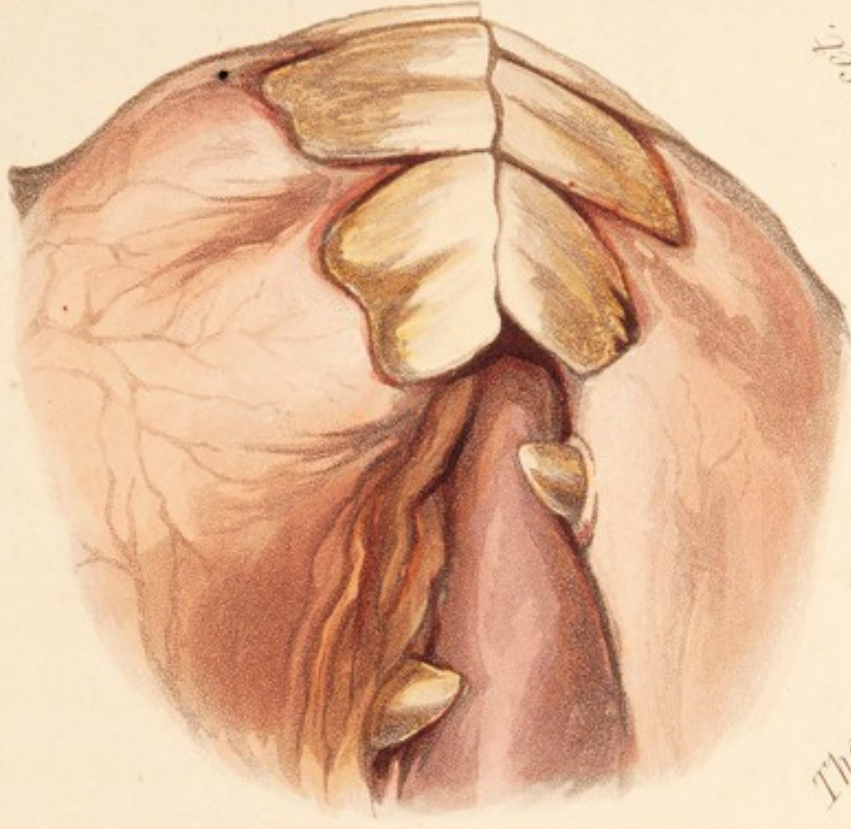
however, is nevertheless easily distinguished by its greater transparency and more pearly appearance. This peculiarity in the *crusta petrosa* not unseldom gives to the six year old mouth a darker aspect than is presented by the teeth of the younger animal; and the author, to convey to the reader some idea of this fact, has purposely rendered the incisors of the next representation of the mouth, as they frequently are seen. Such a circumstance, however, will not confuse the judgment. The corner nippers still look young to him who is acquainted with those signs which denote youth in the horse's teeth, and the coloured engraving will convey a fair idea of the aspect they now put on. The corner nipper, in fact, after the fourth year, leads, in a great measure, if it does not entirely sway, the judgment. This tooth is sometimes called the shell tooth, on account of its *infundibulum* being, for the most part, better exhibited and longer retained than in the other incisors. The tables, however, of the other teeth should also receive some attention: those of the centre nippers may exhibit the *infundibula* shallow, or, in certain instances, when the *crusta petrosa* which lines these cavities is very thick,

FIVE YEARS OFF.



The Corner Teeth only show slight wear and the posterior Margins are rounded.

SIX YEARS OFF.

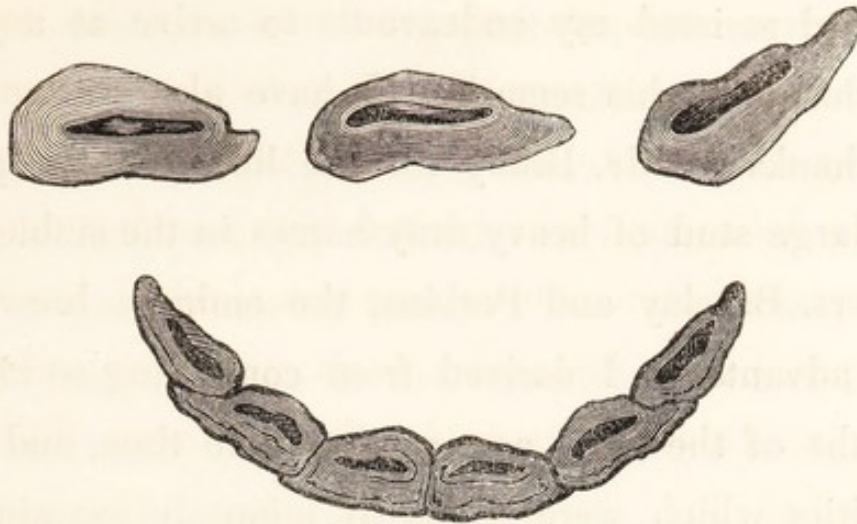


The Corner Teeth look more firmly set and their edges begin to be uneven.

no infundibula may be distinguishable: even then, however, on close inspection, the form of the cavity will be discovered, marked out by a line of enamel, and the space that is usually vacant filled up with a substance, which in appearance differs little from the ivory. The tables of the lateral incisors will be fully formed, and the infundibula is rarely obliterated, while its margin is always circumscribed and well defined, as the previous wood-cuts will indicate.

49. *At six years of age, the corner teeth look more firmly set, and their edges begin to be uneven; they have become more square in the figure of the external surface; the edges of the teeth, when the mouth is closed, fairly meet; the round appearance of the posterior border is nearly lost, and the teeth are altogether of a most prominent character. The table of the corner teeth, nevertheless, is still confined to the part anterior to the infundibulum, which cavity is not yet fairly circumscribed or surrounded by a level margin. The infundibula may be lost in the central incisors, and those of the lateral teeth may begin to look shallow; but more generally these cavities are retained at six years old. The tables, likewise, have*

somewhat changed their positions, and the semi-circle which they formed at the fifth year, now is hardly so perfect, though still well marked. The above description will be the better understood by reference to the coloured engraving, which has been compared with the mouths of numerous animals, viz., Skeleton Sorella, and a brown horse, the property of Mr. T. Brown, &c., &c. The reader, however, will at once recognise the general truth of the drawing, the purpose of which the accompanying wood-cut will serve to explain. The alteration in the semi-circular arrangement will be better perceived by contrasting the present diagram with the one which preceded it, and though the change may not seem very great, nevertheless, sufficient is indicated to instruct the eye accustomed to observe it. The corner teeth have now acquired a degree of surface which will fairly represent a table, though it is still imperfect. The more darkly shaded portion of the separated table denotes the part which has yet received no attrition, but notwithstanding it is readily discerned that the nipper has come into active use.



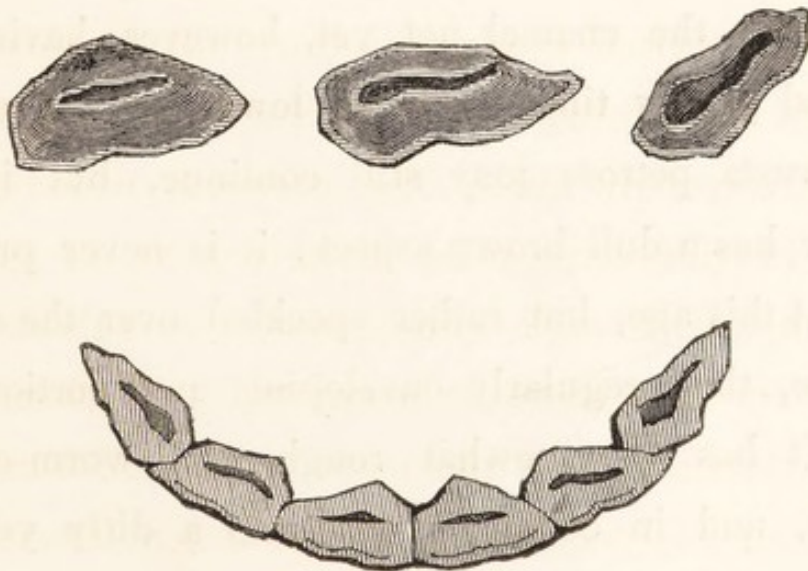
50. *At seven years off, the corner teeth, without showing age, exhibit further evidence of wear.* The coloured engraving to which the reader must refer, exhibits those alterations which have now taken place. The original sketch was made from the mouth of a horse in the possession of the author's father, and having been corroborated by the inspection of numerous others, it is confidently put forward as characteristic of the age. I cannot here forbear from acknowledging the personal kindness and professional attention bestowed upon me by Mr. Percival, who, on being made aware that I was engaged upon a work illustrative of the horse's teeth, not only allowed me to inspect the mouths of the animals under his charge, but honoured me by accompanying

me and assisted my endeavours to arrive at a just conclusion by his remarks. I have also to express my thanks to Mr. Braby for the liberty to inspect the large stud of heavy dray horses in the stables of Messrs. Barclay and Perkins, the eminent brewers. The advantages I derived from comparing so many mouths of the same age at the same time, and the facilities which were given of minutely examining each, enable me with more certainty to speak upon a subject which otherwise it would have been prudent to mention only in the most qualified terms. However, after such ample investigation, I can, with confidence, refer to the plate depicting the mouth at seven years off. Looking at it, the reader will see the teeth have become more white, in consequence of the *crusta petrosa* having, by the natural wear, been to a greater extent removed. The tushes are exhibited as fully up, in which condition they are generally seen. Where the corner teeth meet, they close in such a manner as denotes considerable use. The way in which the gums encircle the necks of the shell teeth has also changed. By referring back to the engraving of the five-year off mouth, the difference will be more readily understood, the

round arrangement of the gums at the earlier age being very significant. The tables of the teeth, however, at this period ought never to be overlooked; they afford, perhaps, the best indications on which the judgment can be based. The infundibula may or may not be gone in the lateral teeth; but those of the corner teeth have at this age become defined. Where the corner teeth meet, in consequence of those of the lower jaw being, in many horses, a little the most forward, the upper shell teeth may present posteriorly a small projection, which is seldom seen prior to the seventh year. When this is present, it is so obvious as not to escape observation, therefore, it has not been depicted in the coloured engraving, which has purposely been made to represent the less marked indication that is more difficult to judge by. The reader will see the projection alluded to slightly indicated in the previous coloured engraving, portraying the mouth at six years off. Where the two shell teeth meet, he will observe that the most backward portion of the upper, not being opposed by the lower tooth, and consequently suffering no wear, bulges slightly downwards. It is this particular part, which often at the seventh year, by the wear-

ing down of the upper tooth, becomes so apparent as to be significant of the age. It is, however, not constantly present, and the tables consequently become of the greater importance, as they are always to be found. Those of the lateral incisors begin to depart from their oval figure, and those of the central nippers are growing decidedly angular: the tushes may have the edges slightly rounded, and the semi-circle which the tables of the incisors formed when the animal was five years old, may exhibit some inclination to change in favour of the lineal arrangement that is in many horses so prominently marked in old age. This semi-circular arrangement of the incisors is most conspicuous when the colt is rising five; and from that period gradually alters, till in very old subjects the tables will occasionally be ranged almost in a straight line. The alteration which takes place in this respect is, however, by no means uniform, and though, consequently, no rule can be absolutely laid down concerning it, yet, from the known inclination of the teeth to assume a certain figure, an inference can be drawn which, connected with other signs, enables a pretty close opinion to

be formed. At the seventh year, however, the corner teeth, their external figure, and the form of their tables, taken in conjunction with the wear exhibited by the central and lateral incisors, and considered with the narrowed but not yet sharp edge of the lower jaw, enable the judge to arrive, with tolerable certainty, at a conclusion. The following representation of the tables, taken in conjunction with the coloured engraving of the seven-year old mouth, will convey an idea of its appearance at that age. The reader will remark the infundibulum of the corner tooth has become circumscribed, being now encircled by a flattened surface, which posteriorly is of some width.



51. *At eight years off, the gum of the lower corner tooth has become square, and the lower tush blunt.*

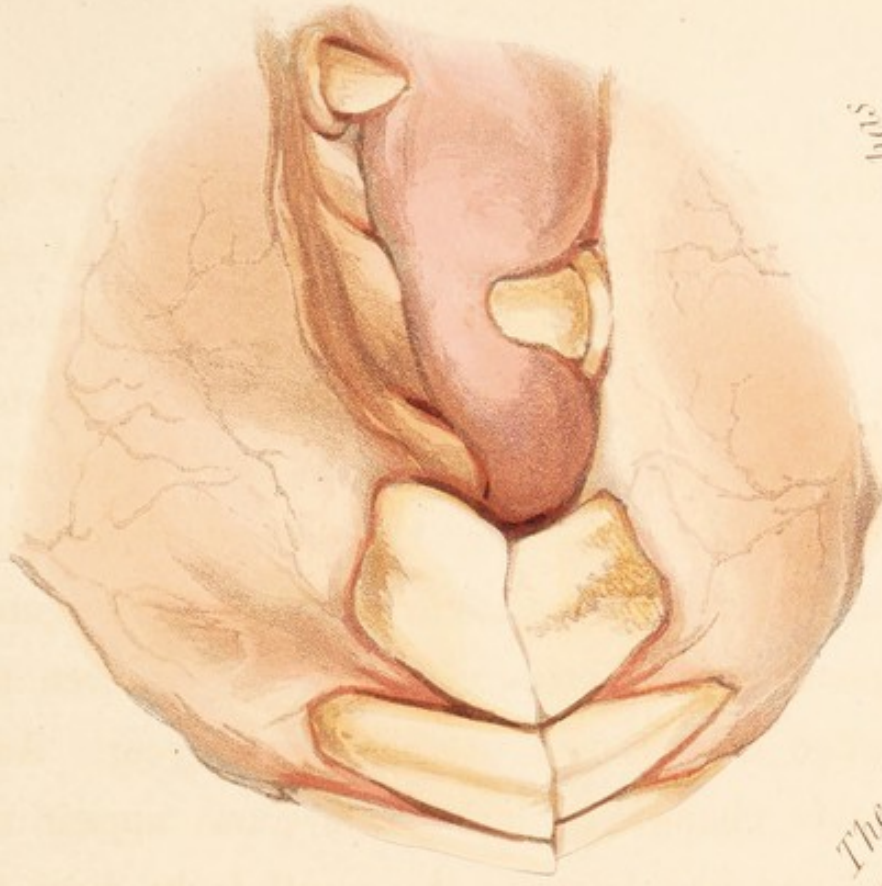
The original drawing was made from the teeth of that noted horse, Oakley; and in order to render it as perfect as possible, the mouths of mares (Meal, Edgworth, Bess, &c.) have been compared. The departure from the circular form of the gum, as depicted in the coloured engraving, is even more marked than it was at the seventh year. Added to this change of figure, the gums appear more hard and less delicate; the mouth looks more firm, and seems to have attained the perfection of its strength. The margin of the lower jaw is now comparatively sharp, and the cheeks are flat. The crusta petrosa on the upper teeth is in a great degree removed; the enamel not yet, however, having a marked yellow tinge. On the lower corner incisors the crusta petrosa may still continue, but it no longer has a dull brown aspect: it is never prominent at this age, but rather speckled over the outer surface, than regularly enveloping any portion of it. It has a somewhat rough and worm-eaten aspect, and in colour is nearer to a dirty yellow than a dull brown. If the posterior angle of the

SEVEN YEARS OFF.



The Corner Teeth, without showing age, exhibit further evidence of wear.

EIGHT YEARS OFF.



The Gum of the lower Corner Teeth has become Square, and the lower Tush

upper corner incisor is pendant, or exhibits that species of notch, which was alluded to in the previous paragraph, it is at the eighth year well shown, and the table has undergone considerable alteration. There is now on the shell tooth, a full table, the infundibula of which, if not obliterated, is always of lessened size, well marked out, and on all sides surrounded by a broad and a flattened surface. The other teeth have also changed their figures. The tables of the centre nippers have taken on a decided angular shape, and those of the lateral display no dubious tendency to assume that form. The infundibula may be obliterated, but more generally those in the lateral and corner teeth are retained, or if now absent, the circle of enamel will, on inspection, show that the cavity is only filled up by *crusta petrosa*, not absolutely worn out. The following wood-cuts exhibit the changes which the tables undergo; and as the eighth year is an important one, inasmuch as the horse which has attained it is called "aged," a double set is here introduced, to show the difference of figure which these parts may present. In those tables, it will be seen the infundibulum has gone from a central

nipper only ; but even in that instance, a white mark indicates that the cavity is merely filled up by *crusta petrosa*, the enamelled lining not being yet worn out. The alteration in the form and magnitude of the infundibula cannot, if the accompanying wood-cut be compared with those which have preceded it, fail to strike the reader ; indeed these changes, aided by the worn appearance of tables of the shell teeth, are now the principal guides when judging of the age by the mouth.



52. *After the eighth year*, there is no certainty in any opinion drawn from the teeth. A guess may be hazarded, and very often that guess will prove correct, but at the same time it should be received only as a conjecture. The chance of naming the age decreases as the number of years increase. After the twelfth, the probability of hitting the exact year

is very small. After the sixteenth year, all is confusion, and there remains no sign which could warrant any person in pretending he could pronounce the age by the teeth. It is true that certain tokens may induce a conviction that an animal is much older than sixteen, and this conviction may be so justified as to amount almost to a certainty; but no man, I imagine, could form any opinion with regard to the number of years by which a horse exceeded sixteen, or pronounce a decision that should have any appearance of exactitude. They who pretend to an ability of this kind, may, in a few solitary instances, strike the point; but repeated failures will show that there is no positive principle in operation to guide the judgment. Indeed the age is most correctly told during the periods of dentition, and up to the sixth year. After the sixth year, the certainty is not so great, but a very fair, if not a positive judgment can be pronounced until the eighth year is accomplished. After the eighth year, no man should give an unqualified opinion concerning the age of a horse. After the twelfth, whatever may be pronounced should be offered only as a conjecture; and, after the sixteenth, the practi-

tioner had better be silent. When stating this the author must be understood as expressing the conviction at which almost exclusive attention to the subject, and much necessary consideration, has enabled him to arrive. It must not, however, be thought that he is arrogating a power of measuring the capabilities of genius; his wish is only to declare the truth as he perceives it. The intention to publish a work upon the teeth has not been concealed; opinions have been solicited and information sought; the author has many obligations to acknowledge; all to whom he has made application have been liberal in their communications; but from no one has he been able to obtain anything opposed to the conclusions he has here promulgated. It may be that hereafter the power of judging of the age shall be extended. Pessina and the Girards thought it could be done with exactitude up to an extreme point, and saw a principle in the latest changes which the teeth undergo. The general experience in this country, however, seems to have decided that, after the eighth year, there is no certainty. With that decision the author is reluctantly obliged to acquiesce, and even to add that certainty is not to

be obtained after the sixth year. This limitation, coupled as it is with a confession of inability, may seem to be a backward movement; but truth cannot retrograde. By ascertaining how far our present knowledge leads us, a motive is given to genius by the opportunity created for its exercise. No pains have been spared to investigate the hypotheses which have been made known; they have been candidly put to the test, and on the proof of their inefficiency discarded. That the reader may judge for himself, the tables of teeth, and mouths of various ages are presented. The altered aspect of the tables at the ninth year is indicated in the following wood-cut, which exhibits these surfaces as gaining depth and narrowing from side to side. This appearance they generally assume, and at the same time the infundibula are either lost or much contracted.



The next wood-cut, which depicts the form of the tables at the tenth year, though true in its general character, will serve to show how far dependance

may be placed in ordinary signs, since the infundibulum of the lateral nipper shows a well-marked cavity, while from the other teeth it seems to be upon the eve of disappearing. On inspection, however, it will be seen that in figures the tables approach more towards the square, which is the last form these surfaces assume.



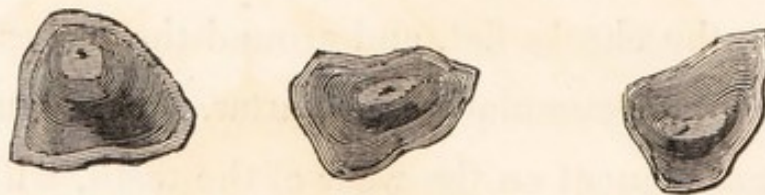
53. *At twelve years old, there may be tartar on the lower tush. The teeth are longer, narrower, and the enamel darker. The coloured engraving, which was, on the last occasion justified by a comparison with the mouth of that famous horse, Charles the Twelfth, will convey a general idea of the prevailing characteristics of this age. The teeth have lost the white and firm set aspect they bore at the eighth year. Often, at this period, they have, by wear, become irregular generally, as exhibited in the plate; the grooves, extending down the length of the upper incisors, contain the remnants of the crusta petrosa,*

which is almost black. The upper tush is usually much diminished, while the lower is long, especially in stallions kept for service. The teeth project more outward and begin to arrange themselves more in a line, no longer showing the crescentic order which they assumed at five years old. Also, by the twelfth year, the tongue, when the jaws are closed, protrudes from the open space between the incisors and molars. The degree in which these alterations have taken place, together with the protrusion of the incisors, is all that is present to guide the judgment; and practical experience is needed, to give him, who attempts to decide upon such weak evidence, any chance of success. As in cases of this description every thing that can help the judgment is eagerly seized upon, the general appearance of the animal is always to be considered; and that may warn the practitioner to modify his opinion. The lower jaw is sharp, the cheeks flat, and around the tushes there may be an accumulation of tartar. It is true the tables, consequent on the wear of the teeth, will have undergone some change, but that alteration is now so slightly marked as not to enforce itself upon the observation. It is easily overlooked, and by no

means easily recognised. The annexed wood-cut will suggest the nature of the change. In it will be seen a further remove from the oval form of these parts in the young mouth. The surfaces have become square or angular, and the corners are only sufficiently rounded to indicate what once was the shape which they exhibited.

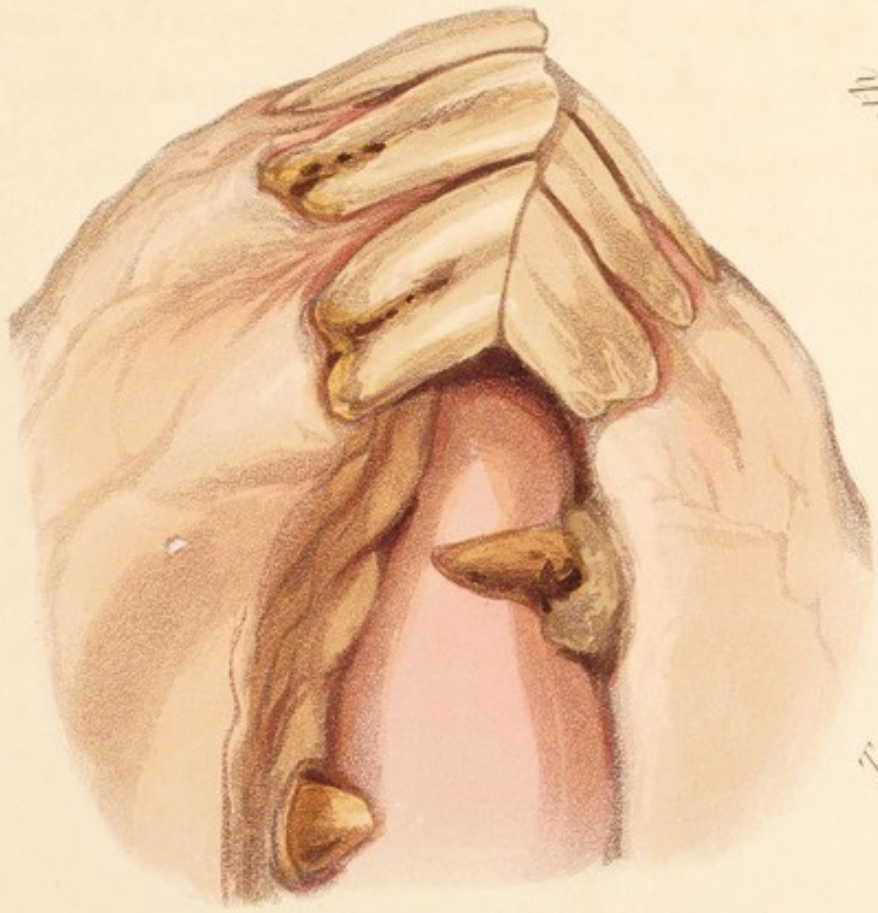


The following wood-cut depicts the tables at the completion of the fourteenth year, and only by careful comparison could the increase of age which they denote be detected. On inspection, however, it will be seen that the irregularities of outline are less prominent even than at the twelfth year.



54. *At sixteen years old, when the teeth are viewed from the side, only two incisors can be seen in*

TWELVE YEARS OLD.



Tartar on the lower Teeth. The teeth longer, narrower, and the enamel darker.

TWENTY YEARS OLD.



The Form of the Mouth changed, and the lower Teeth imperfectly seen from the front.

the lower jaw, as depicted in the coloured engraving, which was last authenticated by the mouth of Muley Moloch, which favourite stallion I was, by the kindness of Mr. Theobald, permitted to examine at his well-known establishment, where I also saw many other horses of the purest blood and highest promise. Of the excellence of the arrangements and the value of the animals, which give character to that gentleman's establishment, it would be presumption of me to speak. I have only to express my admiration of what I beheld, and tender my thanks for the attention I received. The engraving, however, was fortunately corroborated, and its general indications may therefore be accepted. The enamel has entirely lost its white and pearly tone. The tushes, perhaps, loaded with tartar in both jaws, are blunt, and generally either very short or long, inclining somewhat outward. The extension of the crescentic arrangement of the lower teeth enables only two to be seen when the parts are viewed from the side. The tongue protrudes to an obvious degree, and the saliva runs from the mouth when the jaws are separated. The edge of the lower jaw is very sharp and

somewhat retracted, while the incisors have taken a horizontal direction. No sign, however, save the protrusion of the tongue, is positive. The general character is that of advanced age, and this general character, at once recognised by the eye of experience, is more to be depended upon than the teeth themselves. The teeth have now assumed the permanent character of old age; and in the figure of the tables will undergo no further alteration upon which any dependance can be placed. Up to the sixteenth year, however, the tables deserve to be consulted. Below is exhibited such evidence as they present, which the reader will perceive is so nice and delicately marked as to be easily misinterpreted. In the tables which belonged to the fourteenth year, it will be seen the infundibula are almost gone, a speck alone denotes their latest trace; nevertheless, the next wood-cut, which exhibits the tables at the sixteenth year, will show that the absence of the infundibula is not to be relied upon. Still the advance in age is, though feebly, indicated. The central incisor has assumed a form which is peculiarly characteristic of age in the horse. It is seldom that at sixteen

years all the tables take so marked a shape, but some of them, and generally those in the centre, will, at this period, be symbolical of the truth.



Had it not been for the very conspicuous indication of the central tables, the others in the former wood-cut might have been reasonably decided to be more juvenile in their aspect.

55. *At twenty years old, the form of the mouth has changed, and the lower teeth are imperfectly seen from the front.* This circumstance springs from the more horizontal direction which the teeth have now assumed, and the acuteness of the angle which they consequently form when closed. The engraving also depicts that alteration in position which disables a person, standing in front, from well seeing both rows of incisors when the lips are separated. When the upper incisors are fairly presented to the sight, a partial view only of the lower teeth is obtained,

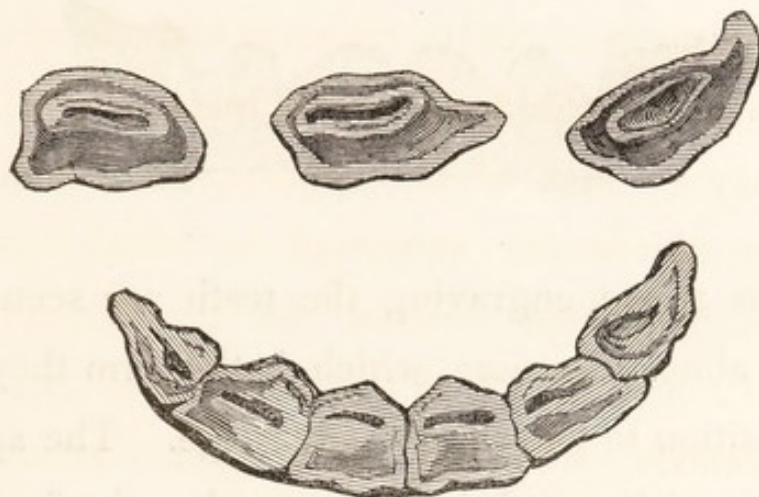
and as the age advances even that is lost. Further inspection also shows additional changes in position, shape, and tint. The grooves are broad, deep, and well marked by their dark colour. Between the upper incisors there are interspaces in which the food has accumulated and become black, giving to the mouth the appearance represented in the coloured plate. The upper tush, which is now of a brownish hue, may be worn to the gum, and the lower continue long and surrounded by tartar, or both may be reduced to mere stumps. The tongue protrudes greatly; the membrane of the mouth seems hard; and no longer vascular, it is thrown into wrinkles. The edge of the lower jaw is sensibly retracted, and its sides are flattened or narrowed. The general appearance indicates the decay of nature. Here again, however, nothing is positive, save the yellowness of the teeth and the protrusion of the tongue. The general character of the animal is of more value than the indications of the mouth; and, persons familiar with horses can, sometimes by this, guess the age of an animal with the same approach to accuracy, which most people exhibit, when pronouncing the extent of an individual's life, by simply

looking at a man's face. In neither instance, perhaps, could the basis of the opinion, which possibly shall approach very close to correctness, be accurately stated. Proof, as to the evidence upon which a conclusion is in such cases based, cannot be anticipated, and to the inquiry how they were able to tell the age, each would probably answer, by the "looks," but neither would be capable of precisely defining in what these "looks" consisted.

56. *At thirty years old, the jaws are contracted; the lower are not seen when the upper teeth are in view.* The coloured engraving, which at first sight seems to suggest that the animal possessed only a single jaw, exhibits the mouth as it appears at the thirtieth year. The animal, the mouth of which is here depicted, had a lower jaw with excellent teeth considering its age, but without elevating its head these could not, while the mouth was closed, be seen, or when seen, the view of those in the upper jaw was lost. This peculiarity arises from the teeth having taken a still more horizontal inclination; they are now crowded together; and, from the irregularity of their wear, may assume the pointed figure indicated

in the plate. The change of colour also has become more decided, and the general indications, which have been before alluded to, are more marked. After what has been so frequently repeated concerning the deceptive character of the tables in extreme age, little, perhaps, need be added to that subject. Nevertheless, to convey an idea of the appearances which these surfaces may assume, subjoined are wood-cuts taken from authenticated mouths, for the inspection of which I am indebted to the liberality of Mr. Ernes, of Dockhead, who has paid great attention to the changes of the teeth. To the honour of that gentleman, I may, while confessing the heavy obligations under which his generosity has placed me, here mention, that no member of the veterinary profession had, to my knowledge, under his care so great a number of animals working at a period of life when the horse is usually supposed to be worthless. The majority of these were in good condition, active, and capable of doing every kind of ordinary service. They presented a pleasing spectacle, more than creditable to the talent of him under whose charge they had retained health and vigour. The aspects which the tables of the teeth

exhibited, however, were such as set judgment at defiance, and for the purpose of enabling the reader to form his own opinion on the matter, engravings of a few of them are here introduced.



The above wood-cut exhibits the tables and arrangement of the incisors as they were seen in the mouth of an animal which was proved to be no less than twenty-eight years old. Any one, who should base his opinion solely on the marks, must have pronounced the creature to have been no more than five, since none of the infundibula are lost. The semi-circular arrangement also had suffered no very material change, and altogether the contrast with the next representation of the same parts, as they appeared in the mouth of a horse which was but one year older, is very striking.



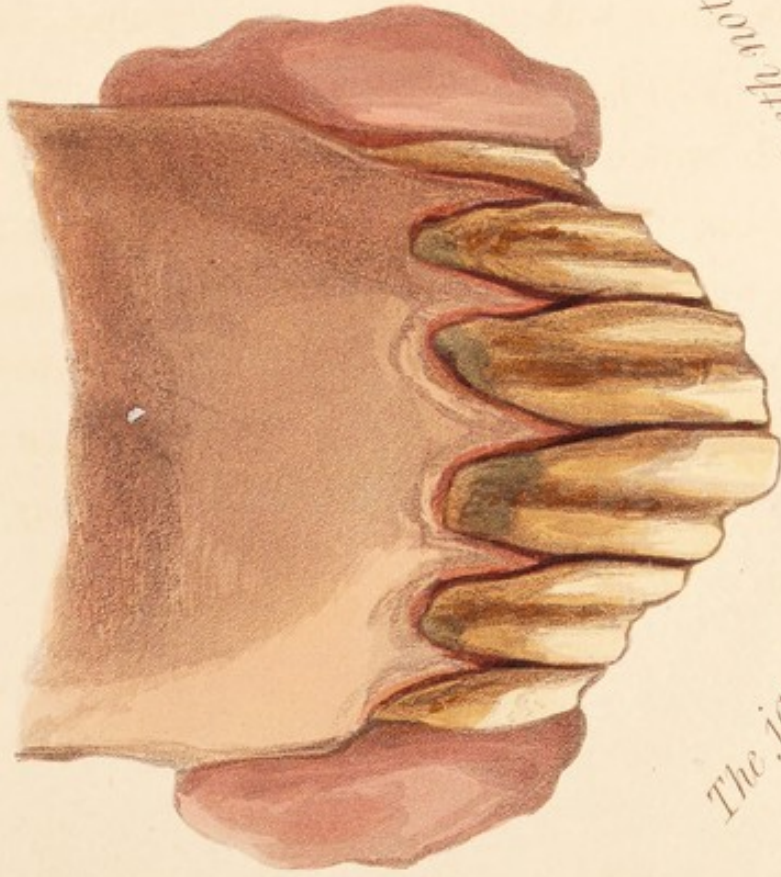
In the above engraving the teeth are seen to be ranged almost in a line, which is the form they have a disposition to take at this great age. The appearance, here delineated, is more true than the foregoing in its general character, the infundibula being entirely worn out; for the specks in the centre of the tables show, not the remains of the last portion of the marks, but the exposure of the upper extremity of what once was the cavity of the pulp. In the next wood-cut, however, which depicts the tables of the teeth which were in the jaw of a horse, that had reached its thirtieth year, and from which the drawing for the coloured engraving was made, displays a portion of the infundibulum still retained in the corner incisor. The true character of age nevertheless is conspicuous in the form of the tables.

SIXTEEN YEARS OLD.



Viewed from the side, only two Incisors
can be seen in the lower jaw.

THIRTY YEARS OLD.



The Jaw contracted. The lower teeth not
seen when the upper are in view.



Such contradictory indications admit of being to a certain degree reconciled. The representations of the tables are correctly given, but, in the living mouths, these were corrected by the appearances of the teeth themselves. The incisors of the horse which was twenty-eight years old had suffered but little wear. An unusual degree of hardness, or an extraordinary power of self-preservation, contributed to keep them, so far as the tables were concerned, in appearance, young, long after the season of youth had passed. Almost from the fifth year the tables would seem to have suffered but a very gradual change; for even when twenty-eight, these parts do not indicate the horse to be more than "aged." The absence of wear may, in some measure, be attributed to the kind of food which the animal had consumed, it having been chiefly fed from the manger; and also to its being of a quiet disposition, or not inclined to bite and snap when the groom was dressing it. The want of wear, however, did not necessitate the

cessation of growth, which went on at the natural rate; therefore, though the tables had a very youthful look, the teeth were, nevertheless, unusually long, and gave to the mouth a decided appearance of age. Their colour, and the removal of almost every vestige of the *crusta petrosa*, together with the general appearance of the horse, was sufficient to awaken those suspicions which would warn the practitioner. The excentricities, however, which particular parts can exhibit, will teach the student, that a conclusion should only be drawn from observation and comparison of all the various signs which the teeth present. No sign can be singly relied on; but, by weighing the evidence, and placing the contradictory indications in opposition, something approaching to truth may, even in extreme age, be deduced; though such deductions, for obvious reasons, ought to be expressed with caution, and never, under any circumstances, positively advanced. Mr. Henderson, the respected veterinary surgeon to Her Majesty the Queen Dowager, possesses in his museum many interesting specimens of the teeth. Among the rest, he has the jaw of an animal which was ascertained to have reached the thirty-eighth year. This pre-

paration, however, exhibits no sign that could characterize the extreme age which the horse had attained, and I allude to it, only as a confirmation of the opinion I have expressed, that, as the period of life advances, the mouth of the horse becomes more and more difficult of interpretation.

57. *The tricks, that are practised on the teeth,* are so much talked about and so generally feared, that the subject demands a few words in explanation. The breeders are known to extract the milk teeth, hoping thereby to hasten the growth of the permanent incisors, and to increase the apparent age of the colt. The gums they are likewise known to touch with the hot iron, or to freely lance for the same purpose. All of these practices are common enough; but that they accomplish the design of the persons who employ them is not at all certain. By either of these practices the animal is pained, and pain does not favour development, but, on the contrary, retards it. The suffering, however, may be brief, yet the effect does not stop there. If the milk tooth is firm in the mouth, when the attempt is made to extract it, in nineteen cases out of twenty, it will

be broken and the fang left in the jaw. When the extraction of the milk teeth has been general, I have seen numbers of horses, with the broken fangs in their mouths, palpable evidences that the animals have been tampered with. But, supposing all of the tooth to be removed, nothing would be thereby gained. The permanent tooth does not push out the temporary; nor does the temporary, so directly obstruct the coming up of the permanent, as to render its presence or absence of much consequence. If the fang be removed, there may be nothing to absorb, but on that account it does not follow that there will be anything more deposited. The body of a man does not grow larger because one or more of his limbs have been amputated. On the contrary, the shock occasioned to the system by the operation, and the consequence ensuing on the loss of blood, may cause an immediate diminution of the frame. So, if a horse's tooth be drawn, the animal is alarmed, tortured—and, if the creature recovers from these effects very speedily, so that no loss of growth could be estimated, certainly the most favourable circumstances would not allow us to imagine any stimulus to development had been created. There will be

some loss of blood, and this, however slight it may be, nevertheless being taken from the immediate part, must act as a local depletion. Now to deplete is to check growth by abstracting the very source of nutriment. The hemorrhage, however small, must be injurious; and the mouth being made more or less sore, the inclination to feed, as a natural consequence, is diminished, thereby further checking the development. I cannot see in what manner the extraction of the milk teeth is to hasten the growth of the permanent incisors; but I can perceive that the operation may have the opposite effect; and I have known the practice to have been followed by the non-appearance of the very tooth, the protrusion of which through the gum, it was employed to quicken. The tooth, which previously seemed to be on the eve of piercing the gum, after the extraction of the milk incisor never came up,—nor will any person who has thought for an instant, wonder if the violence, necessarily used, does occasionally injure or rupture the delicate vessels and gelatinous tissues of the pulp. More often the breeder's impatient interference breaks the tooth off at the neck and leaves the fang in the jaw. This he has not the skill

to extract, and as it is not afterwards absorbed but speedily assumes a dark colour, it remains a tell-tale and an eye-sore during the life of the animal. Had the colt been left alone, the fang in a few months would, by the natural process, have been absorbed: but the force which broke the tooth, though incapable of extracting it, probably ruptured the delicate tubes of the absorbent vessels. The broken member is left in the mouth, either to act as a foreign body, or to become united by ankylosis to the jaw, and continue for life a deformity. The folly of the practice will surely on reflection be evident to all; and the other means employed for the same end are in a like degree injurious. The breeder will consult his own interest best by studying the feelings of his animals. For the sake of profit, if not for the love of humanity, he had better cease to torture the poor beasts by which he hopes to gain. Suffering will neither engender spirit, growth, or fat, and the market pays price for each of these. The mouth of the horse is too important towards the value of the animal to be ignorantly mutilated. Let the mind reflect, before the hand is permitted even to use the lancet. To lance the gums of the human infant was

once a favourite practice; nor has the custom at the present time fallen quite into disuse, but it is generally resorted to only during the cutting of the primary teeth, and not commonly adopted to facilitate the appearance of those teeth which the horse-dealer employs it to quicken. In the latter case, on man the gum lancet is not employed; and, if found useless on one animal, a strong inference is created as to the inutility of constantly experimentalizing with the instrument upon another. By incising the gums a wound is created, the part is thickened, and a cicatrix induced; the effects of which are to cause an impediment to the growing tooth; and this being seen and corroborated by practical observation, the best dentists and surgeons of the present day are not very enthusiastic in the use of the gum lancet, which they have in a great measure cast aside, and which is beneficial only in scientific hands. The loss of blood likewise is to be considered, and that certainly aids in retarding the growth, which the adoption of the other means, general with the breeders of horses, could not accelerate. The employment of the cautery, to expedite the appearance of the teeth, is so strange a resort, that I can only

account for the use of that agent by imagining certain persons to be totally ignorant of its action. In the first place, it destroys the part with which it comes in contact; inflammation follows and suppuration ensues; a quantity of blood is diverted to the surface, and of course drawn from the pulp of the new tooth, which originally it flowed to and nurtured. A slough must take place, and the mouth remain sore till the eschar is thrown off and the exposed granulating surface cicatrized. But wherever the hot iron is applied the immediate part is thickened, rendered more hard and tense. Which of these effects is it the horse-dealer regards as likely to promote his wishes? A little knowledge would inform any one, that the cautery must act in the opposite direction to that, which it is supposed, by ignorant people, to favour. Indeed, I do not think, that horse-dealers or others have yet obtained so great a mastery over nature, that the dame can be made to hurry at their bidding, however cruelly their orders may be enforced. A "Yorkshire five" may sound well, but there is no more possibility of making a four-year old colt, by barbarity, show the development of a five-year old horse, than there is, by wrenching,

cutting, and burning, of making a boy of fifteen look like a man of twenty. Nature obeys her own laws, and is not yet subjected to human practices. Careful rearing, nutritious food, sufficient exercise, and no work does promote development, and of the growth thereby engendered, the purchaser has no reason to be in fear; for if one part shows maturity, he may be assured, that the other parts are also equally matured. The time the animal has lived is not of half the consequence, that the use which has been made of its life is, to the future possessor. The horse that has a mouth indicating five, and that can be proved to be five, if it has been worked from its earliest year and stunted in its food, has less energy and life than a younger creature forwarded by the fostering care of the breeder. The two animals are not to be compared. Supposing the one to be no more than four, it possesses the vigour and development of five; while the other, which is five, may have the decrepitude and constitutional infirmity of twenty. Let not the buyer fear the deceit of the breeder, but without dread accept the mouth as proof of the age; if the animal is not in years, he is in development, that which the teeth declare. To

this conclusion, however, some will oppose their opinions. The animal, they will argue, has been stimulated to exhibit an unnatural maturity, and the seeds of future disease have thereby been planted in the system ; therefore, it will be urged, the worth is depreciated. The statement looks well, but it is of no value, for a little inquiry will prove it to be based on false principles. Excessive stimulus checks the growth, or causes early disease, sacrificing either the health or life of the being. The feeder knows, from experience, that the quantity of nutriment must be measured by the powers of the creature that consumes it ; and that over-feeding, by impairing the digestion, destroys or weakens rather than nurtures the body. The stimulus, pushed beyond a certain point, would keep the horse in the infirmary, and never fit it for the market. Every dealer knows this, and though such persons are, by the prejudice of the public, obliged to keep their animals loaded with fat, or in what is called "bloomy condition," they nevertheless fear to maintain this state of body for too long a period ; and while it lasts, constantly resort to drugs, to counteract that tendency to disease which it engenders. They treat their stock, almost as a

physician would treat so many city aldermen; and give dinner or digestive pills almost as regularly. A *fatted* beast is always diseased, but an animal liberally fed is thereby rendered the more healthy. In fact, the dread of those results which ensue from comfort is, with regard to the horse, quite as unfounded as the fear, that mankind once had, of the "miseries of the rich," and the envy, poets taught them to indulge, towards the starvation of the poor. Such idle fancies may be dismissed with profit to the person who discards them; but at the same time there are some practices the reader needs to be cautioned against. To give the face of the horse a youthful appearance, some of the class of dealers who frequent public markets, low auctions, and country fairs, puncture the skin at that part where the falling or depression is seen above the eyes in old animals. Having inserted into the orifice a small quill, they then blow into the part, thereby inflating the subjacent tissue, and concealing the cavity. This notable artifice, which is called "*puffing the glym*," ought to impose upon no one. Should the trick be suspected, let the hand be carelessly raised to pat the neck and cheek of the

animal, when it can, under pretence of likewise stroking the face, be passed over the part which is supposed to have been tampered with ; and in the act a little pressure may be made upon the suspicious region : then, if the swelling has been induced in the manner stated, the passage of the hand is sufficient to squeeze out the air, and the contrast which the two sides of the face will afterwards present, gives to the countenance of the poor horse, a very knowing and peculiar expression. Let the person, however, who thus undertakes to expose roguery, be assured of his ability to protect himself in the office he has assumed ; for the gentlemen who display their ingenuity on horses, are not averse to occasionally mutilating the human frame. To lay bare and detect such low, mean, and obvious cheater, as the above, properly belongs to the police ; and the least acute of the force, ought to be equal to the detection of so gross an imposition. The swelling, when caused by inflation, always has an unnatural aspect, such as a school-boy would find no difficulty in recognising, after his attention has been directed to the point. It looks puffed, and when the jaw moves, the part does not play freely

with the motion. These circumstances, at a glance, declare the cheat which the pressure of the hand can, in an instant, prove to have been practised. The artifice, however, when adopted, ought to be of no avail. Young horses often exhibit the depression above the eye, of great depth; nor is it unusual to see old animals, in which the cavity is naturally shallow. The qualified judge, therefore, glances at, but never permits the state of, the part, to influence his decision; and the trick, when resorted to, can impose only on those who are too vain to acknowledge their ignorance, or too mean to pay for protection. Other indications are of greater worth, and to these, observation is directed. The roundness or flatness of the cheek, the sharpness or fulness of the lower jaw, no art can imitate: these, consequently, receive more attention. The eye is directed to the mouth; and still supposing the reader to be present at such places as the parties who practise tricks with horse flesh mostly frequent, let him be thought desirous of purchasing the animal, and therefore proceed with an examination: it will not be long before the teeth will be inspected. When the lips are separated, the incisors may be

long and horizontal in their inclination ; and, by the time this is noted, the seller probably has volunteered the information, that the horse he is most reluctantly obliged to part from, was six years old last grass. The expression of surprise such a statement elicits, is answered by oaths as to the fact, and direct accusations of ignorance against any one who would assert the animal to be a day older. The jaws are pulled asunder, and all the marks are seen. Here is proof ; no man who knows anything of horses, he is told, would reject such evidence ; and a host of ready bye-standers stare at the mouth, and only doubt if the creature is full six *yet*. The judge also looks at the marks, and then walks away : he has formed his opinion, and the sight of the marks confirms him in the conclusion he had arrived at. The absence of the police may caution him not to expose himself by noticing the shout of defiance, and bellowed taunts, that signalize his retreat ; but he has seen the animal is a “bishop.” Now what promoted the poor brute to ecclesiastical dignity ? The term in horse slang, simply means that the marks are not natural, but have been made. There are two means by which that can be done. When time

presses, and tools or skill are wanted, the tables of the teeth are touched only with a red hot wire, which leaves a black *mark* wherever it is applied. This, however, is a coarse expedient, and the more usual practice is, to dig out the cavities with a kind of engraver's tool, and then to blacken the spaces thus created. The infundibula are imitated with much nicity; but the resemblance, however close it may be, never for a moment imposes on the qualified judge. The shape of the table, characteristic of the old tooth, cannot be altered, nor can the edge of enamel, which should gird the infundibulum, be artificially produced. Moreover, many of the people who "bishop" horses, are content to perform the operation only on the lower jaw, leaving the upper teeth untouched, because these are not generally inspected. Should such be the case, of course the marks will be more or less faded, where naturally they would be most fresh; for the infundibula of the lower jaw are lost some years prior to those of the upper disappearing. The attempted deception, therefore, is never successful, save when the "copers" are fortunate enough to meet with a "flat," who has just knowledge enough to be very wise in his own

conceit. It must, however, be remembered, that the lower class of dealers are not limited in their transactions, and often dispose of animals to persons of respectability; therefore, it is not unusual to find horses standing for sale at commission stables, with mouths of a most conspicuous character. The owners of such horses may be gentlemen of the highest probity, and in ignorance the age may be misstated. For this reason, no man should purchase a horse of any individual, without having the animal previously examined by a certificated member of the Royal College of Veterinary Surgeons. The money so spent, is the smallest item in the account; and the sum saved by following this rule is often disproportioned to the expenditure,—to make no estimate of the disappointment and vexation which may be prevented. Respectable dealers will not knowingly allow the character of their stables to be injured by the presence of a “bishopsed” animal. This class of persons are very scrupulous in that respect, but they are not always able to detect the truth—their education is often limited, and though good ordinary judges, they cannot, under every circumstance, decide correctly—they unconsciously deceive, being them-

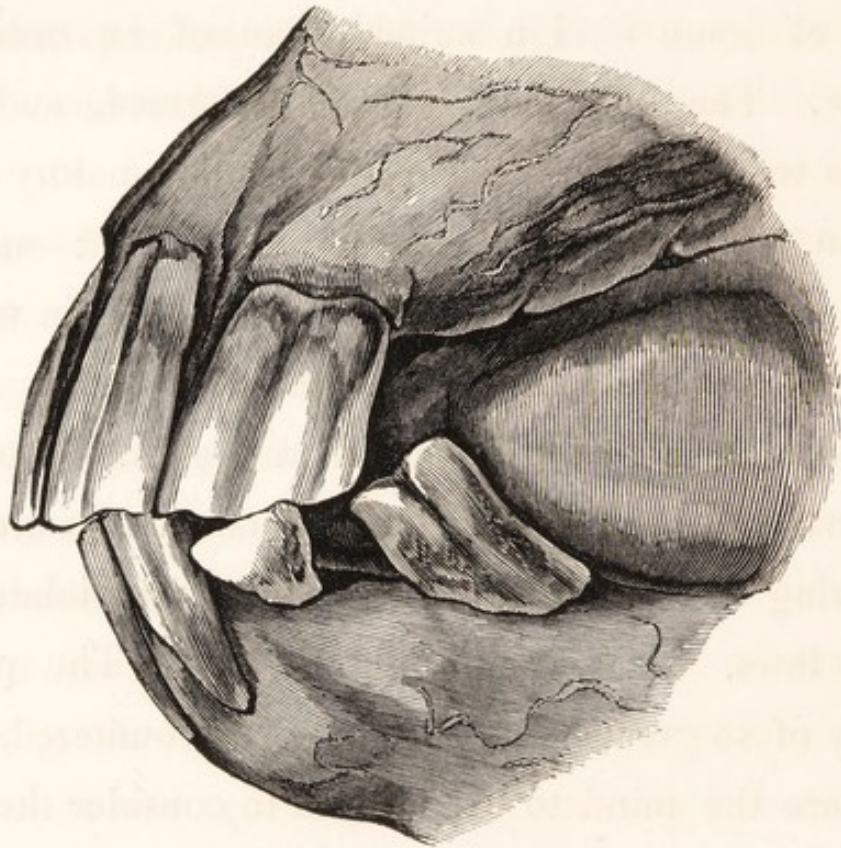
selves deceived ; and consequently every purchaser should take the precaution pointed out, no matter whence, or from whom, he may be buying a horse. Were all to act in the way indicated, much law would be spared, and a great deal of anger allowed to slumber. The dealers are not the rogues the enlightened public are fond of believing—many among them are as honourable as all men should be—some of the class, however, never let a horse escape out of their hands un mutilated. The teeth invariably receive the primary attention : if long, they are, by the application of a file, reduced to the length which the self-taught equine dentist supposes proper to youth. An acid is also applied to the enamelled surface, in order to render it white. No vast good is effected, but if the means were not designed to impose, no great harm would perhaps be done. The acid is not allowed to corrode the tooth, and the diminution of the length may possibly in some degree benefit the animal. The welfare of the creature, however, is not the object sought—the hope is to cheat ; but no person who ought to be trusted, or even to trust himself to purchase a horse, should be so imposed upon. Whiteness is no sign of youth in

the tooth of a horse, and the file cannot make the tables assume the juvenile figure. Horses that show such mouths, may be easily recognised—perhaps they are quiet while their legs are handled, but shy when the head is touched—they are not vicious, but timid, and the teeth tell the reason of their fear. It is well to pass them by, and dangerous to accept them at any price. If the teeth have been tampered with, what tricks may not have been practised to conceal other defects?

58. *Irregularity of growth in the horse's teeth*, should, in all cases, be early noticed, and speedily attended to, for so much of the worth of the horse depends on the animal's ability to feed, that it may be said, "no teeth no horse." The milk teeth are so regular in their growth, that I have not been able to hear of, or meet with a specimen, in which they were eccentric. The permanent teeth, however, are not unusually irregular; the most common irregularity which they exhibit, is that of retention of one or more of the milk incisors, and this more frequently is to be seen in the lower than in the upper jaw. Mr. Ernes, of whom I have before spoken as an excellent

judge of the teeth, and a most able practitioner, was kind enough to show me the mouth of a cart horse which was under his care ; the lower jaw had eleven incisors, but of these five were milk teeth. The appearance which the mouth presented was rather that of some foreign animal than of an ordinary horse. The bone had become deformed, and the gums were in several places in an inflammatory condition. Mr. Henderson possesses a most curious preparation of the lower jaw of a horse, in which there is exhibited eleven permanent teeth. The appearance which this specimen presents is extraordinary, and the existence of such a monstrosity, showing the extent to which nature may violate her own laws, deserves special attention. The possibility of so great a variation being encountered, will prepare the mind to expect and to consider the less marked deformities, which in practice are not unusually met with. It is not unusual to find horses with eight teeth in one jaw, two of which are generally, on inspection, found to be retained milk incisors. The milk teeth, if allowed to remain after the horse incisors are fairly up, often give to these last a very strange appearance. The following

wood-cut depicts the mouth of a mare, to which my notice was directed by Mr. Henderson, the gentleman to whose generosity I have before had occasion to confess my obligations.



The corner milk tooth here not having been extracted after nature had failed to remove it by the process of absorption, has caused the last permanent incisor to take an unnatural situation, where, being removed from attrition, it has become of extraordinary length, and looks as much like a curious tush as the thing it

really is. Such a state of the mouth is far from rare, and because of its frequency, being the more likely to be met with in practice, it was chosen for illustration. The molar teeth are less subject to distortion, but, nevertheless, are sometimes irregular, and from the same causes. I have seen the palate pierced by a tooth which grew in an unnatural direction. The treatment, in both cases, would be alike. The milk teeth should never be allowed to remain in the mouth after the corresponding permanent teeth are fairly up. If removal prior to this period does no good, now the operation is suggested by its accordance with the natural process, and the sooner it is undertaken the better : any delay will only create difficulty, and render the restoration of the displaced tooth, more problematical. The unabsorbing fang, will, in time, become united to the bone ; and if its extraction is then attempted, fracture of the jaw may be the consequence. In no instance should the stable keeper be told to pull out the teeth : he has not the proper instruments for the purpose, and must use unnecessary violence even if he does no greater injury. The animal, besides, is rendered shy of him, in whom it is essential it should be educated to

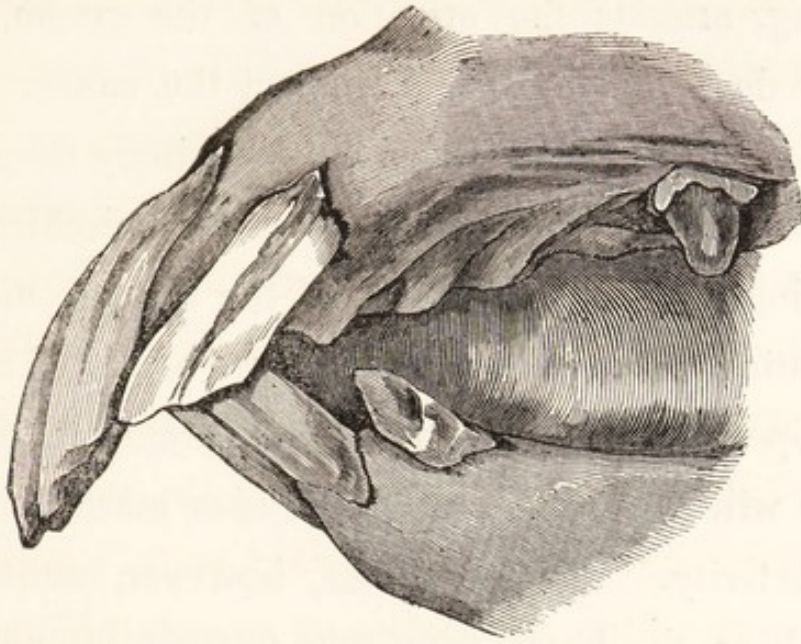
repose confidence; and many a horse, by the bungling efforts of such people, pretending to operate, is ultimately rendered dangerous in the stable. Moreover, the horse owner cannot be too seriously cautioned, against giving permission to those who attend on his animals, to overstep their lawful limits. In the first instance he may, perhaps, congratulate himself upon the result, but speedy experience will convince him, to his cost, of the danger of the system. If the operation should have been delayed so long, as to allow the teeth to have become of unequal lengths, then, after the milk incisors are extracted, the permanent teeth must be rendered level; and, however far apart they may at first be, in time they will approximate. The operation, which is recommended, any Member of the Royal College of Veterinary Surgeons will execute; and, as in skilful hands, it is never dangerous, so it should, on no account, be entrusted to quacks or pretenders. For some irregularities, however, there is no help; for instance, when the lower jaw exhibits only four permanent incisors, which is by no means unusual, and which, in the majority of cases, could be traced to the efforts made to extract the corner milk teeth,

before the time had arrived for their removal. An animal with such a mouth is obviously deteriorated. The lessened number of its teeth may be of little consequence while it is young and kept in the stable. During the earlier years, the corner nippers, which are those most frequently wanting, are not in perfect apposition, nor are the incisors of so great importance, when the food is to be pulled from the rack or gathered from the manger. But at grass, especially in old age, when horses are most frequently turned out, and when the spreading of the semi-circle brings all the teeth into play, none can be spared. The absence of one-third of the nippers in the active jaw, would then cause the animal more work for its livelihood, and probably counteract all the benefit which "the run" was intended to produce, even if more serious evils did not ensue. The eccentricities of the teeth should always be regarded, to conjecture how far they may retard the welfare of the horse. The presence of an additional molar in each jaw is sometimes seen, and is hardly to be counted a defect: such supernumerary teeth are generally posteriorly situated, and of small size; they may cause no inconvenience, and their

existence not be suspected during the life of the animal. The reverse, however, is the case when an extra tooth is found only in one jaw. I am indebted to Mr. Dunsford, a gentleman who pays more than usual attention to every case entrusted to his care, for a fine specimen of the evil which may result from an abnormal molar. In the lower jaw, on the near side, are seen seven molar teeth; and the last has, from the absence of attrition, grown to a length which caused it to do serious injury to the mouth. The teeth are placed one behind the other in a perfect row; hence, as well as from their all being of the full size, one, the last in position, was occasioned to project, forcing itself through the gum, even into the substance of the superior maxillary bone. The horse was destroyed, having become useless, in consequence of its inability to masticate its food. Another defect in the molars is observed, in these teeth sometimes being placed apart from one another, leaving interspaces between them, in which the food accumulates, and inflaming the gums, causes the animal much pain whenever it attempts to feed. For this, nothing can be done, beyond giving the poor beast its meat artificially

prepared ; but with all care the unfortunate animal becomes emaciated, and is speedily consigned to the knacker. Fortunately, however, the molars are not often irregular in their growth. In fact, most irregularities of the teeth must be carefully sought for, but one form which is not rare by any means ought to be always observed. In certain animals the lower jaw is so short, that the creatures cannot place the incisors together or in apposition : the consequence is, that the lower incisors being active instruments, have to perform their functions at considerable disadvantage ; but, nevertheless, they act and receive wear. The upper incisors, however, are, in such mouths, subjected to little attrition ; the corner, and a portion of the lateral nippers alone, meeting each other ; hence the central nippers, which grow more forward than they ought, at length project downwards, and overhang those of the lower jaw. This arrangement of the incisors constitutes what is called a "parrot mouth," because of the resemblance which the teeth bear to the bill of the bird. Most old horses are more or less parrot-mouthed ; but young horses also occasionally exhibit mouths of this description, and in these last it is certainly a defect, for

in a state of nature, or at grass, the animal would be necessitated to tear rather than bite its food. The proprietor of such a beast, therefore, can or ought never to turn the creature out, but keep it constantly in the stable, and under many circumstances this would entail inconvenience and expense. There is nothing to be done for such a malformation, but an allowance should be made for it in the price. That the reader may be able to recognise it, a copy of a mouth, in which the deformity was well marked, is here presented. The animal, which was introduced to my notice by my talented friend, Mr. Broad, of Paddington, was twenty-one years of age; and though more conspicuous cases of the kind are sometimes seen, the one I have chosen for illustration shows a rather greater malformation than is usually met with; but, nevertheless, it well illustrates the point upon which I have been dwelling.



The molars sometimes wear unevenly, their edges becoming as sharp as knives, and their tables slanting in an unnatural degree. The slanting tables cannot perfectly comminute the food, so that which is swallowed, not being properly prepared, affords little sustenance; while the sharp edges cutting the inside of the mouth, and causing it to ulcerate, render the animal, from the pain, disinclined to eat. The contraction of the bones of the lower jaw, in some old horses, by disabling them from bringing the tables of the molars in perfect apposition, is the cause of these teeth assuming such a shape; for in young animals this species of distortion is never witnessed, save as the consequence of disease. The horse not

feeding, attracts the attention of the groom, and rarely does his intelligence detect the cause. Any member of the Royal College of Veterinary Surgeons, however, will soon discover the seat of mischief; by reducing the cutting edges of the molars, and invigorating the constitution, while the ulcerated mouth is properly treated, and the food carefully attended to, he will soon restore the horse once more to health and activity. The proprietor, however, must ever after have the horse, from time to time, attended to, as the symptoms denote a relapse; and with such precaution the animal may continue in full work for a number of years. Not a few horses show the edges of the incisor teeth perfectly rounded, so that when the mouth is closed the tables no longer touch in every part; indeed the form of the tables is destroyed, and the age of the animal can by them hardly be conjectured. These rounded teeth have been supposed to denote crib-biting, and gentlemen have for fifty years been told, to set down every horse presenting such a mouth, as a confirmed cribber. The notion, however, is not supported by fact, for cribbers generally exhibit even mouths; and I have not yet been able to discover an instance in which this

habit had caused the tabulated surfaces of the teeth to be convex. The round form of the tables results from the horse biting when being groomed, and generally is seen in those which are of an excitable nature. These animals are usually good servants, but this shape of teeth unfits them for being turned out to grass, as the cutting edges of the nippers are destroyed.

59. *The diseases to which the teeth of the horse are subjected*, are, fortunately, not very common; though this assertion must not induce any person to imagine that his animals may not be afflicted in this respect. Every owner should be particularly watchful on such a point; for so important are the teeth to the welfare of the animal, and so difficult of cure are neglected cases of this description, that numbers of valuable horses have been and will be slaughtered, simply on their account. No animal is exempt from this species of affliction. One man may during his life possess many horses, and die without knowing how fatal are the diseases of the teeth. Another person, whose stable shall contain but a single nag, may, in a few months, be taught

how dreadful are the ravages which this affection can induce. All therefore should, for the security of their property, be aware of the first indication of this species of disease. Though the teeth are not vital organs, and the course of the malady is generally slow, nevertheless, the consequences to which it gives rise are such as in every case, deteriorate the value of the animal; and, in many, nay, perhaps the majority of instances, render it alike prudent and humane to deprive the poor beast of existence. Probably I do not assert too much when I add that, in the ordinary examination of horses, little attention is paid to the condition of the teeth. The incisors are inspected to ascertain the age, and any peculiarity in these is particularly noted; but for the most part the molars are passed over without comment. Here the rarity of disease may shield the negligence of the practitioner, who, nevertheless, is in every case exposed to blame through his inattention. Such a man may pass through a long practice, and escape reproach; but, nevertheless, the first horse on which he pronounced an opinion, might have blighted his reputation, by exhibiting the disease he had taken no pains to detect. Every

animal purchased of a party whose warranty might be at all suspicious, ought to be seen to feed before a conclusion as to soundness is pronounced. If then the molars are affected, the truth would be made obvious; and there is nothing can render a horse more unsound than disease of these teeth. The animal so afflicted, may, for a time, be equal to its work: yet to render it capable of exertion it requires continual care, and in the end, spite of all precaution, it may become worthless. Some means should therefore be adopted to ascertain that the grinders are free from disease, and a little corn will enable the fact to be conjectured. Should any suspicion be created, a further examination will discover the truth. The molars, in the judgment of every one who has thought upon the matter, are the teeth which, especially in aged animals, require attention. The incisors indicate the age, but they are not usually liable to disease. I have not met with a single case in which the incisors were affected, nor in which the tushes were diseased. I am, however, informed by Mr. Field, whose high reputation and extensive practice give weight to his assertion, that he has had to treat horses for disease

of the incisor teeth, and has even been obliged to remove a portion of the lower jaw in order to procure relief. Other practitioners, of whom inquiry has been made, have not known such a form of disease, neither have I witnessed it : instances of this kind, therefore, are rare, and hitherto have not attracted attention. The honour of making known the possibility of their existence, belongs to a gentleman whose name is proudly associated with the science which it has so long adorned. The incisors of the colt are not, however, liable to be seriously affected : when those teeth decay, age must have advanced. During colthood, nevertheless, the teeth, if exempt from disease, may be the causes of great constitutional disturbance. Mr. Percival, the gentleman who, as editor of the "Veterinarian," and author of the best and most elaborate works on the diseases of the horse that have yet appeared in the English language, attaches much importance to those ailments incidental to dentition. Of the consequences that may ensue from the cutting of the tushes, he adduces positive proof, and from his admirable work on "Hippopathology," page 172, vol. 2, I cannot forbear extracting the following most valuable case :—

“ I was requested to give my opinion concerning a horse, then in his fifth year, who had fed so sparingly for the last fortnight, and so rapidly declined in condition in consequence, that his owner, a veterinary surgeon, was under no light apprehensions about his life. He had himself examined his mouth, without having discovered any defect or disease ; though another veterinary surgeon was of opinion, that the averseness or inability manifested in mastication, and the consequent *cudding*, arose from preternatural *bluntness* of the surfaces of the molar teeth, which were, in consequence, filed ; but without beneficial result. It was after this that I saw the horse ; and I confess I was, at my first examination, quite as much at a loss to offer any thing satisfactory as others had been. While meditating, however, after my inspection, on the apparently extraordinary nature of the case, it struck me that I had not seen the tusks. I went back, and discovered two little tumours, red and hard, in the situation of the inferior tusks, which, when pressed, gave the animal insufferable pain. I instantly took a pocket-knife, and made crucial incisions through them, down to the coming teeth, from which moment the horse recovered his appetite, and by degrees his wonted condition.”

The fact here recorded has certainly been generally overlooked ; and Mr. Percival deserves the gratitude of his professional brethren for directing their observation to the point. Every practitioner, however, has met with instances in which the molars were implicated. There are two forms of disease to which these teeth are liable ; caries, or decay, and a loss of vitality, or death. The death of a tooth has

not hitherto been observed upon by veterinary authors, but it is not rare. The causes which may give rise to it cannot be accurately stated, though they may be conjectured. The vessels that nurture the fang and ramify through the pulp, are small and delicate; the alveolar cavities are thin, some of them in the upper jaw being not thicker in parts of their walls than brown paper. The force of the masticatory muscles is very great, and if any hard substance be taken between the teeth, it is easy to imagine that the minute arteries of the fang should thereby be ruptured. The effect produced upon the pulp, and the transient agony occasioned by biting a piece of hard crust, are familiar to every human being; nor can we suppose that the horse's teeth, especially when the greater strength of its muscles is duly considered, are not liable to similar and proportionably greater injury. There may be no history to such a case, no record of the date when the occurrence took place; for the horse is not always watched during the time of its feeding, nor were it watched, is it possible that the groom would attribute the sudden exhibition of pain to the right cause. The primary effect is therefore misinterpreted or unnoticed;

but after a time it is remarked that the creature is longer than its companions emptying the manger ; then it begins to quid its hay,—that is, the hay is taken into the mouth partially masticated and formed into a pellet or round mass ; but instead of being swallowed, the prepared morsel is allowed to fall from the mouth. Should no advice be taken, the horse becomes bad in its coat, and loses flesh. No amount of corn, or extra grooming, will restore it to condition ; medicines may be administered with no better effect. The disease is strictly local in its nature, and the constitutional symptoms are only sympathetic. Should the affection still be suffered to proceed unchecked, the animal is continually moving its lips ; either it is restless in the stable, or leans the head against the manger, and neglecting the food which is before it, remains dull and quiet, the eyes half closed, and the breathing quickened. A dose of medicine seems to do it some temporary good, but the purgation has hardly ceased before the symptoms reappear ; saliva runs from the mouth, and the food in the manger is rendered sloppy, almost like to a mash, before it is eaten ; the bones of the face at last swell ; the breath becomes fetid ; and

a thick offensive purulent discharge issues from one of the nostrils. That discharge is not continuous ; sometimes it will cease for days, and the proprietor congratulates himself that the horse is getting well ; the fetor, however, remains, and after a time it breaks forth again with redoubled vigour. The animal becomes daily worse, and would linger on, but the patience of the owner is exhausted ; the knacker is employed to cut short the hopeless trouble and expense, and then a hasty examination is made for the cause of all this mischief. Such is a condensed description of the customary incidents, in the order in which they ensue ; but of course the intelligent reader is aware that the symptoms of disease cannot be mapped down, as though they were results obtained from inorganic matter. Such symptoms always more or less vary, though upon the whole they present sufficient similarity to enable them, in every case, to be interpreted ; and hence the value of practical experience, which enables the party possessing it to recognise a fact, when not fully declared. The writer cannot, to the like extent, communicate instruction ; he must condense his remarks, and be content to speak a general truth ; for if he descends to particulars

he becomes tedious, and that which he would teach is disregarded. Of course the symptoms vary: all may not be present, yet one or more will lead the practised mind to the seat of injury. The history, however, which has been recorded, supposes the dead tooth to be located in the upper jaw: should it be situated in the lower jaw, some difference will be presented in the effect; for then the injury is not so serious. The discharge from the nostrils does not ensue, but the inferior maxillary bone enlarges, and the breath becomes offensive. The swelling of the bone takes place immediately under the tooth which has ceased to be a part of the living frame; and at this point also an abscess forms; this bursts, and discharges an unhealthy matter: unlike ordinary abscesses, however, which, when they have thrown out their contents, close, this, notwithstanding that the orifice is dependent, exhibits no disposition to heal up: a thin stinking liquid continuously issues from the opening, which becomes hard around its edges, and the hair about which sticks out, looking coarse and ragged. Such outward and visible signs are hardly to be misunderstood; and attention being directed to the mouth, the examination of the teeth

will confirm them. From one jaw will be felt a molar projecting far above the level of the rest, and in a like degree will the opposing tooth in the other jaw be found depressed—worn down actually to the gum. All is now clear; and the question is, what shall be done? In the first place the condition of the mouth has certainly deranged the digestive organs, and, where there is room for choice, no operation, however simple or apparently safe, should be undertaken while the stomach is out of order. The seat of the disease is known, but the general health is first attended to; and when that has been in some measure re-established, the great object of the surgeon is fit to be accomplished. The question is, which of the teeth are to be interfered with? One is diseased or dead, and there can be no doubt that the diseased tooth should be removed. That which is unnaturally long, obviously indicates that its power of growth is retained; and though hypertrophy is an abnormal action, teeth are not parts liable to that species of affection. The one which by its growth indicates vitality, therefore displays no symptom of disease; but the tooth that is reduced to the level of the gums, tells us that its power of

self-preservation has ceased, and that its vitality is gone. If that tooth be felt, it will, in the majority of instances, be found loose, and therefore it can be easily extracted : the operation, however, is not then ended. Should the affected organ have occupied the upper jaw, a quantity of pus may flow freely into the mouth on its extraction, but more frequently such will not be the case : nevertheless, the discharge from the nostril, (should the case have been of long standing,) together with the softened and swollen condition of the facial bones, may convince the attendant that matter is locked up in the maxillary sinuses. Some writers speak of the antrum as the part most seriously affected ; but I cannot find any thing corresponding to the antrum in the horse's head. That animal has no development of this description, and therefore it only shows ignorance to operate with a special view to opening an imaginary cavity. The maxillary sinuses are spacious cells, and freely communicate with the frontal sinuses, which are also large. These facial sinuses have but a limited and kind of valvular opening into the nasal chambers, and if pus is allowed to remain within them there is little hope of cure : therefore a

means must be found for its escape. To this end the finger is employed to probe the alveolar cavity, whence the tooth was taken, and it will probably prove to be of no great depth. An instrument constructed for the purpose is now used, and with it a hole is made through the walls of the alveolar, directly into the maxillary sinus—his knowledge of anatomy teaching the operator so to direct his hand that none of the important nerves and vessels, which ramify through the parts he is penetrating into, may be injured. On the withdrawal of the instrument, pus will mostly follow, but not gush forth as from an ordinary abscess. A dependent orifice has now been established, and if the case is not a severe one, that may be sufficient: if, however, the disease is aggravated, it will be necessary to trephine the frontal and perhaps the maxillary bone, leaving in each a free space, from which a circular piece has been removed. Through the superior opening, warm water is injected; but if the stench be very offensive, a weak solution of chloride of lime or of creosote may be employed, and must be daily repeated. None of the coarse applications which some ignorant persons recommend, ought to be used. A strong solution of

the sulphate of copper or of zinc, by coming in contact with a large surface of granulating mucous membrane, can hardly be expected to allay its irritability, or dispose it to take on a healthy action ; and a seton, forced barbarously through the orifices made with the trephine, can only exist as a foreign agent, keeping up the action which the surgeon is desirous should terminate. Gentle means are, in every sense, the ones to be adopted. Mild tepid injections are to be employed, with the intention to wash out the accumulated pus, allay the inflammation that caused it to be secreted, and correct the diseased tendency of the part. All stronger agents are barbarous ; and I have witnessed animals rendered dangerously vicious by their employment. When, however, the acute stage has past ; when the inflamed and secreting surface has lost its activity, not unfrequently succeeds a dull, lethargic state, which the mild treatment, hitherto advised, will not touch : now it is that stimulating injections are beneficial ; and however much reason there was in the first instance to denounce their employment, they are now indicated by the soundest principles of scientific practice. Even at this time, however, they must not be pushed too

far. The constitution should be stimulated, that their effect may be aided, and their continuance necessitated for the shortest possible period. The sulphate of copper or of zinc; the acetate of copper or of zinc; the chloride of zinc or of lime; the nitrate of silver or of mercury; the black or yellow wash, in strength proportioned to the symptoms, may here be of service. It is well, however, to remember that these agents soon lose the efficacy, and the greatest benefit, therefore, is obtained when they are occasionally changed on the first sign of their potency decreasing. Still injections alone cannot be expected to effect a restoration, and, therefore, topical measures must be combined with constitutional treatment. A course of mercury may be tried, or some of the many agents, which, like balsams, peppers, and essential oils, act on the mucous system, can be administered,—never, however, relying upon any one medicine for too long a period; but, as in the previous case of injections, changing it wherever the drug appears either to have no effect, or to have lost its power over the system. By such treatment, actively employed and combined with a proper attention to exercise and diet, the case must be

aggravated indeed which is beyond relief. The cure, however, we must not expect to be quick; but it will generally in the end be realized. Perseverance may be required, but barbarity will not hasten success. I object to many of the practices which the veterinary professors of the London College inculcate to their pupils; because those practices, in my opinion, being based on false principles, are needlessly severe. Of the potent solutions habitually employed at the St. Pancras School, I have spoken; but there is another practice to which I have not alluded: corks are forcibly thrust into the holes made by the trephine, under the notion that by such means the opening can be kept free, and the wound uncorked and corked up like the mouth of a bottle. Mr. Percival has spared me the trouble of exposing the folly of the idea, and the inutility of the practice. That gentleman tried the notable experiment, and found that the cork in no degree delayed the consequence it was employed to retard. The presence of a foreign body thrust into immediate connexion with a diseased surface, and violently there retained, must cause excruciating agony—promote serious irritation—and might lead to the worst

possible results. The ignorance should indeed be gross, which could conjecture such a vulgar resort was capable of inducing the slightest benefit. Equally objectionable is the custom recommended by the veterinary professors, of shutting an animal up in a close stable, and causing it to inhale the fumes of chlorine gas. Chlorine is an irritant to mucous membranes. If the nasal cavities were the seat of the disease, the passage of the air being rapid through these channels, and retained for a comparatively long period in the bronchia, the supposed remedy would be far more likely to affect the lungs, than to act immediately on the part which it was intended to benefit. In respiration, however, it is not probable that even during health, any large quantity of air enters the sinuses, which, in these cases, are the seats of the disease; and when those cavities are blocked up by an abnormal secretion, none could possibly gain admittance to them. Chlorine, therefore, obviously is inoperative in the direction where its remedial agency is desired to act; and it does some injury. It violently affects the animal which requires to be soothed; causes it to endure much inconvenience and even suffering; produces

quicken'd respiration with violent cough, and may be reasonably supposed to lay the foundation of subsequent disease. The advantages of its employment have not been demonstrated, but the results of practice rather show it to be injurious. By the members of the veterinary profession it is not generally used : gentler measures are of greater importance, and these ought, only under very peculiar circumstances, to be abandoned. There, however, yet remains to be described, the mode of proceeding when the diseas'd tooth is seated in the lower jaw. In that case, a sinus or canal, discharging an unhealthy matter, is present. No treatment will cause that sinus to close, while the diseas'd tooth is retained ; and until its removal is effected, all applications designed for that end are thrown away. After the tooth has been extract'd, a solution of sulphate of zinc may, with advantage, be daily inject'd, and constitutional measures at the same time adopt'd, till an alter'd action has been call'd forth, when the annoyance will quickly cease. The enlarg'd bone will, however, remain ; and, in the majority of cases, it may be best no further to interfere with it, than by the external application of such agents as are likely

to promote absorption. In such cases, however, no means are very speedily beneficial, and time must be given for their operation : but should the deformity be great, the firing iron may be employed to cause exfoliation of the part. Yet as in the removal of one blemish, it is not justifiable to create another, the violent agent must be applied after a particular manner. The integument should be first divided, and the edges of the incision drawn asunder, so as to expose the bone, which alone should be touched with the cautery. By this simple expedient the osseous structure will be destroyed ; and as such structure is not highly sensitive, the suffering of the animal will be slight, while after exfoliation has taken place, the trivial cicatrix will be concealed by the hair. When caries is present, the symptoms do not materially differ from those described as indicating the death of a tooth. The disease may commence at any part of the fang or crown ; but the structure which it generally first involves in the horse, is the *crusta petrosa* : for however far the caries had proceeded, I have usually recognised it working from this substance into the ivory. The *crusta petrosa* is the least osseous, and most vascular

of all the structures that enter the composition of the tooth. In proportion to the vascularity, may be estimated the disposition to assume disease; and when it is further remembered that the *crusta petrosa* being the external, is the most exposed portion of the tooth, and that any wrenching action, or other violence, would first affect this part, the dullest comprehension will perceive why the *crusta petrosa* is likely to be the primary seat of caries. Enamel is not subject to caries, nor is it otherwise involved than by being deprived of its supports, and chemically acted upon by the decomposed matters with which it is in contact. The ivory, however, may, in exceptionable cases, be the original seat of the affection; and when decay has commenced, this part of the tooth is speedily diseased. When caries begins, there is only partial death of the tooth; but the portions which retain their vitality and are becoming affected, cause excruciating fits of agony. Before anything can be perceived by manipulating the molars, the animal may exhibit frequent slight fits of illness, being occasionally dull—off its feed—sluggish at its work—soon fatigued—resting the head on the manger, and displaying symptoms of transient attacks

of fever. On other days the animal is lively; eats well, looks well, and works well, and is all the owner could desire. Something is evidently wrong, but as yet all is doubt: then the hay is quidded and another examination of the molars is made, when there may be detected a little roughness on some part of one of those teeth, and the mystery is explained. There may be no, or a very slight increased growth of the molar, which, in the opposing jaw, corresponds to that which is evidently carious. The carious tooth may be firmly implanted; and yet, notwithstanding the firm manner in which it is fixed in the jaw, no time ought to be lost in its removal. The operation may occupy some time, and should be conducted with proper caution if the horse be young; and I have by me a molar taken from the jaw of a colt that was rising four, in which the *crusta petrosa* was diseased. A wood-cut representing that tooth, is inserted at page 29; and the darker spot indicates the place where decay had commenced. During youth the fangs of the molars are of great length, consequently, any violence would be likely to do injury to the thin plates of the alveolar cavity. In old animals the fangs being

shorter, greater speed may be allowable; but in every instance where the tooth is firm, judgment must be exercised. Supposing the horse to be young, the following method will be found to answer:—The precise position of the tooth having been ascertained, and the animal cast, traction, with a proper instrument, is made in the right direction. In the first attempt the force is not designed to extract the tooth; if it can be perceptibly moved or raised upward, so that the nerves and arteries of the pulp may be broken or ruptured, a great point has been gained, and the molar should be no further drawn in the first instance. The instrument should be then loosened, and another hold having been taken, a renewed effort should be made, when a little additional way may be gained. After this, a further hold should be taken, and thus adapting the grasp of the instrument to each pull, and proceeding gradually, the molar may be extracted. The operator, however, must not, in every instance, anticipate that he will be thus successful. The tooth may be perceptibly moved, but after this it may resist all subsequent attempts. The surgeon will become aware that only great force could accomplish

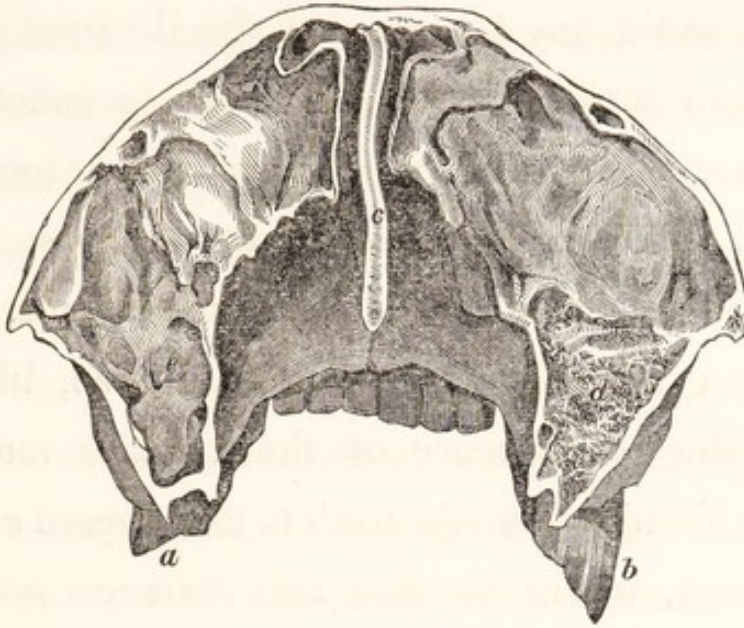
his wishes, and he will therefore reflect whether the employment of the necessary violence might not fracture the jaw as well as extract the tooth. Something has been gained by rupturing the arteries and nerves. The pain and course of the disease has, in a degree, been checked. The molar is no longer a part of the body, but a foreign substance; and Nature, if left alone, will proceed in her own way to eject it. The course, however, that Nature, if unaided, would pursue, might be too slow to prevent evil consequences. The operator, therefore, discontinues his attempts for the present; and though some foolish persons will think slightly of him, for not at once doing the thing he desired to accomplish, he orders the animal to be let up, and led back into the stable. Many a proprietor has been so displeased by this, that he has thereupon sought other advice; and the next operator has pleasingly surprised him, by extracting, with ease, the tooth which the first wisely forbore to wrench out of the jaw. The fact is, that the time which intervened had made a material change; the molar had become loose, and he who properly refused in the first instance to drag it forth, would now, had he been permitted, have taken it

out without difficulty. Indeed in every case where the operator is made conscious of great opposition from natural causes, it is better to cease all attempts for the present—to wait for a week or two, and then renew the trial; and even make a third effort, after a like pause, rather than by unjustifiable violence hazard an accident, perhaps more fatal in its consequences than the evil which it was desired should be removed. The course of the malady allows the surgeon to exercise his patience, without effort; and even if danger threatened, his principles teach him that force is never justifiable. Gentle, resolute, and collected, must such a person be at all times: the violence he seems to employ is but the proper application of his art, and the speed he appears to make is but the graceful use of the time and means at his command. Often does he to the ignorant appear to be idle, when he is only anxiously waiting for the proper time to commence his operations; and frequently is he accused of precipitation, when he knows that activity alone can crown his efforts with success. Let there then be no authority exercised over him whose painful duty it is to deal with disease. The means at his command are confessedly small, the end

to be accomplished is acknowledged to be great. The labour is harrassing, the result is dubious, and any interference can but deteriorate from the success of the issue. A wise person will therefore see often, observe much, and think long, before he presumes to suggest anything to a medical practitioner, and never will a command issue from his mouth. All, however, within and about the stable, are, for the most part, in their own conceits, qualified to cure the horse; and curious are the suggestions obtrusively volunteered, and the judgments pronounced during every operation. Frequently, indeed, is the animal sacrificed by the ignorance of its anxious attendants, who, in their zeal, will often, out of their scanty wages, purchase injurious nostrums, notwithstanding a member of the Royal College of Veterinary Surgeons may be in regular attendance. Happily for the teeth, no specifics are yet declared, and the groom is therefore unwillingly obliged to be idle. The owner should also be passive, seeing that which is ordered is administered, and taking care that no charms are employed. When the tooth that was carious is in the early stage extracted, the animal is by a little con-

stitutional treatment, afterwards quickly restored, but from time to time will require attention ; for the teeth that have once been operated on, will, at intervals, ever after during the life of the horse, need the hand of the surgeon. If caries, however, is neglected, and proceeds to the last stage, cure is all but hopeless. During the death of a tooth, the symptoms are continuous. In caries, there are intermissions, seasons of uncertain duration, during which the horse appears to be free from suffering ; but the effects, if not so rapid in their development, are more frequently fatal in their termination. When a tooth has lost its vitality, it becomes a foreign body, which Nature, in time, will cast out. The retention irritates the surrounding structures, but the irritation may in part be regarded as a restorative process. When caries takes place, a portion only dies, but that portion has all the injurious effect which could be attributed to the former case, and even more, for the remaining vitality in the unaffected part of the tooth, prevents Nature from resorting to that process by which she would otherwise cast off the dead matter. In consequence of this, a foreign substance is retained for a longer period, and at the same time disease is

progressing. Here, therefore, is an additional cause at work, and hence the excess of effect. The arteries which nourish the pulp, and the crista petrosa, proceed from the vessels which nurture the bone, and supply the mucous membrane of the sinuses with the means of secretion. The same, likewise, may be stated of the nerves going to the tooth, and though through these last the constitution is affected, it is mainly through the agency of the blood vessels, that the sinuses become diseased. Hence the necessity for decision, and the need of judgment, in the application of the remedy. To enforce the foregoing remarks, and convey to the reader a slight idea of the consequences which ensue from a carious tooth, the accompanying wood-cut is introduced. The specimen selected for illustration, does not exhibit a rare or extraordinary proof of the results of this species of disease.



The head of a horse has been divided below the orbits, and a back view of the facial portion is here shown, the spectator being supposed to look into the cavities, which have been thereby exposed. *a* indicates the molar teeth on that side which was not the seat of disease, and they are of the natural length and obliquity. *b* denotes the teeth on that side where the disease was seated, and shows them to be not only unusually slanting on their grinding surfaces or tables, but also of considerable length. It was the last tooth on this side which was carious, and the shape of the molars has been occasioned by the animal during its life, being unable, because of pain,

to freely use these organs in chewing its food. The effort to avoid any stress upon the diseased tooth, has caused those on the same side to suffer only partial attrition; hence they have become long and slanting, presenting sharp pointed edges, which lacerated the lining membrane of the mouth. The incisors, a distant view of which is given, likewise display the consequence of the animal's mode of feeding. Turning from the teeth to the exposed cavities above them, it will be seen that these are not symmetrical, or of equal dimensions, which in the head of a healthy subject, they undoubtedly ought to be. Those on the diseased side are not only the largest, but differently formed. The alteration has resulted from the inflammation and accumulation of pus within them. Something besides pus, however, has been thrown out. *e* represents the healthy maxillary sinus as an empty space: *d* is the like part, but it is here filled by a fine cellular structure composed of bone, which has been produced by the action of disease. The plates which form the cells are delicately thin, and beautifully arranged: the little cavities were once full of a thick and sanguineous matter, and the larger spaces above them contained

a very fetid but almost solid substance, which was pus, that, by being pent up, had become of a cheesy consistency. *c* indicates the nasal division, or cartilaginous wall, which separates the two chambers of the nose. As will be observed, it has been forced on one side by the enlargement of the affected parts.

60. *The agents which are likely to injure the teeth*, have been, perhaps, too little regarded, especially when the importance of these organs to the horse is considered. Some grooms, to increase the appetites of the animals under their care, sprinkle vitriol, or sulphuric acid upon the food; and the horse will ultimately become fond of this kind of seasoning to his corn. Some veterinary surgeons, even of high standing, will administer monstrous doses of the sulphates in solution; and others will mingle, for a lengthened period, large quantities of the acids in the animal's water. No suspicion seems hitherto to have been entertained of the ill effects likely to ensue upon a mode of treatment, which is often prolonged for months. The human physician, however, has remarked, that most acids have a tendency to affect the teeth, and that sulphuric acid,

whether in the diluted state, or in combination with substances of low affinity, is particularly destructive in this respect. The patient who now takes the soluble preparations of iron, is provided with an instrument to convey the liquid into the pharynx, and prevent any portion of it from coming in contact with the teeth. Those who swallow such a form of medicine, without employing the tube, soon exhibit the consequence in the general discolourization and decay of the mouth. The man, however, gulps his physic, and can rinse out his mouth if the taste be retained; the horse, when it takes a drench, holds the liquid for a considerable time before it swallows, and the administration of the fluid is not very quickly accomplished. Now, in proportion to the duration of contact would be the effect; and if the hasty deglutition of the one being cannot save the teeth from the ravage of the sulphate, is the prolonged retention of the substance likely to be without effect upon the same organs in the other? The horse, however, takes the sulphates of a strength which the human being would not survive — where the one for a dose swallows a grain, the other may imbibe a drachm. The consequences must bear some proportion to the

quantity, nor will the composition of the horse's tooth allow us to suppose that it is less affected by chemical agents. The enamel of the horse is more speedily acted upon than that of any other animal I am acquainted with; and the substance being unorganized, the results obtained by experiments tried on it when removed from the body, are as conclusive as any effects produced during the life of the animal. The sulphates are potent and valuable medicines; the Veterinary Pharmacopœia could not afford to discard them; but they can be administered in substance, and should with caution be exhibited in a liquid form. I am positive when promulgating this opinion, and nevertheless I have no instance of their injurious effects to adduce. I have not been able to trace caries in the horse to the use of the sulphates or of acids, but the mind often recognises what the senses fail to perceive; and the fact is so clear to reason, that it is not disproved, because it hitherto has not been rendered plain to the vision. Neither does it invalidate my conclusion to adduce instances where the horse had been observed to exhibit no affection subsequent to the use of these medicines. The negative can establish nothing. The cause has not

been suspected, and the effect, of course, has not yet been observed ; but we abuse our reason, if we refuse to listen to its teachings. I am not likely to have met with the proof it may be desirable I should adduce ; for perceiving the evil I early forbore, to render possible any evidence of its tendency in my own practice. Herein lies my excuse ; and though it may not be satisfactory to all, the arguments I have advanced, I think, must be plain to everybody. The sulphates, in substance, are as efficacious as when given in solution ; and if so large doses cannot be administered in the former manner, the necessity for such prodigious quantities has never been demonstrated. Let it, therefore, only be admitted, that there is room for suspicion, and perseverance in the old practice is no longer justifiable. The number of horses that exhibit diseased teeth, teaches us to look for some cause. I cannot attribute every case to derangement of the digestive organs, or to idiosyncrasy. The latter term rather avoids the question than elucidates it ; and the former effect is as likely to be produced by imperfect mastication, consequent upon chemical injury to the teeth, as to be the primary cause of the disease of the masticatory organs.

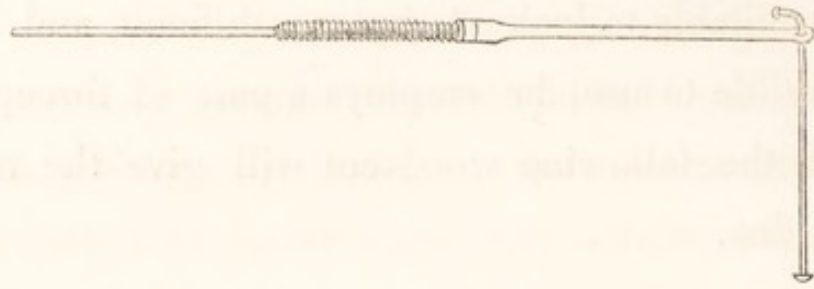
61. *The instruments used in connexion with the teeth of the horse* are not very numerous. *The gum lancet*, shaped like that used by the human surgeon, and employed after the same manner, is seldom required, save for the tushes, when any knife will be found equally if not even more convenient. The rasp or file, for it is either, according to the taste of the surgeon, though most commonly the former, consists of the necessary part that gives the name to the instrument attached to a long lever, which is inserted into a handle. Its employment is rather laborious than difficult, and demands more endurance than skill on the part of the practitioner. Several of different degrees of coarseness should be used, and during the operation, a pail of water ought to be at hand, so that the roughened surface may be constantly washed and moistened, to increase its cutting power, and prevent it becoming clogged. The rasp, however, though fitted to reduce any slight inequality, or take down the sharp edges of the teeth, is not sufficiently operative to level the long projections that are often found in the horse's mouth. For that purpose a guarded chisel has been employed ; but the blow of the hammer or mallet very

often fractures the alveolar cavities, and the cutting edge, despite the guard, generally wounds the mouth. The rasp may be tedious, but the chisel is dangerous ; and neither one or the other are proper for the purpose, though till lately, these rude tools were the only dental instruments the veterinary surgeon could boast of. A want of some more surgical and appropriate means of shortening the projecting molars has long been seriously felt ; and that want the ingenuity of Mr. T. W. Gowing, the esteemed practitioner of Camden Town, to whose inventive genius the members of the veterinary profession are so largely indebted, has at length supplied. The instruments he has constructed have two grand recommendations: they are equally simple and effective. Seeing how little complexity they exhibit, it seems strange that no one should have previously thought of them ; but the same thing is generally said of every invention of real utility. The only difficulty in these matters is to catch the idea, and this Mr. Gowing has most happily accomplished. He has produced a complete set of veterinary dental instruments ; discarding all of those which have hitherto been employed, with the exception of the mouth rasp, which he leaves

untouched. Instead of the old tooth key which was so formidable to look at, but so difficult and often impossible to use, he employs a pair of forceps, of which the following wood-cut will give the reader some idea.

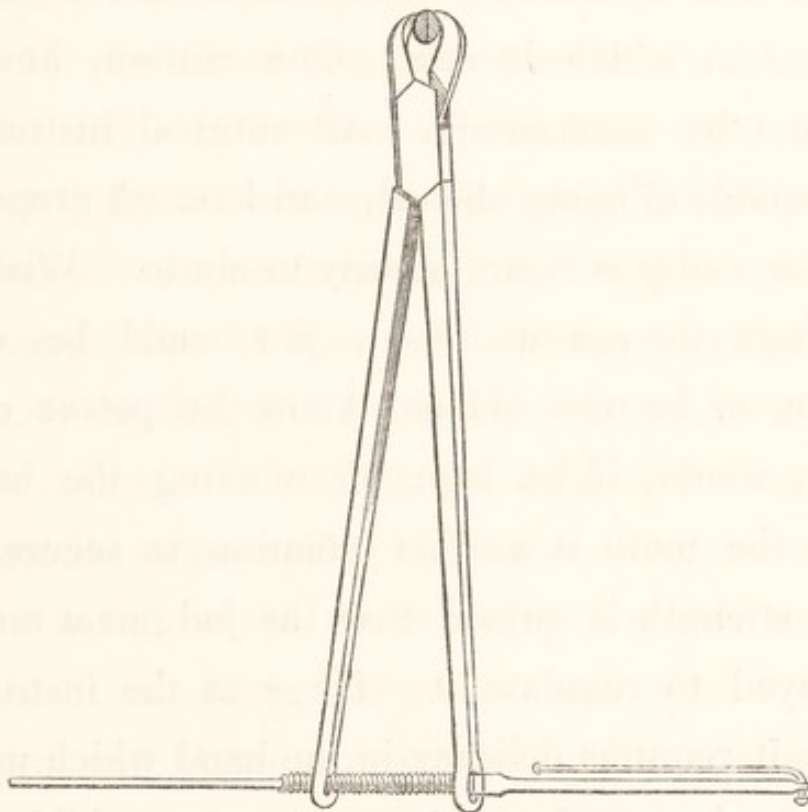


They are about twenty-two inches long, in order that they may be applied, if required, to the most backward of the grinders, and of such substance, as renders impossible any springy action which might cause the bite to be lost when the force was applied. As will be imagined, forceps of such dimensions are not to be used by the unassisted hand. The reader, by looking at the end of the handles, will observe that one is comparatively large: the smaller of the two contains within it a female screw, and the other is only a plain eye. To act on these, a cross handle or lever is added, and of this the following is an outline.



This, as is shown in the wood-cut, consists of two pieces, the smaller of which works freely in a hole made for its reception, and being curved at one end, can be either extended in the manner represented above, or laid close to the lever in the way depicted in the next view of the instrument. It is what is technically called a "tommy," and its use is to gain dispatch and power in the employment of the forceps. The main part consists of a rod of steel, having in the centre a screw, which at the end towards the "tommy" exhibits an enlargement or shoulder. Such are the various parts, and when using them, the operator having fixed the claws of the forceps upon the tooth he wishes to extract, gives the forceps to an assistant, whom he orders to hold them firmly in their situation. He then takes the handle, and introducing it through the open eye with the "tommy" as rapidly as possible, winds it round until he feels

the grasp is secure. Any amount of power can be thus obtained ; for as the screw threads through one handle, the shoulder presses against the other, and thus forcing the claws together, fixes them upon the substance which may be placed between them. When this is done, the operator closes or folds up the free lever, and using both hands, has at his command a power which will not necessitate employment of his utmost strength.



The above wood-cut depicts the forceps as they appear when put together ; and to render their mode of

action more clear, a body indicative of the situation which the tooth would occupy, has been introduced. The advantages which these forceps have over the tooth-key in common use, are so obvious, that the reader will not require they should be pointed out. The benefits which this instrument confers, are indeed great; neither can it be supposed that the principle can be changed, or its adaptation improved upon. For its purpose, the thing appears perfect; and I can speak confidently as to the admirable manner in which it acts. One caution, however, may not be unnecessary. All surgical instruments are capable of being abused, and in exact proportion to their utility is their liability to abuse. With Mr. Gowing's forceps a horse's jaw could be easily broken, or he who did not know the power of the screw, would, if he kept on winding the handle, crush the tooth it was his intention to secure. So much strength is gained that the judgment must be employed to regulate it. Huge as the instrument looks, it requires delicacy in the hand which uses it. With such a tool at his command, a child is in power equal to a giant; and the man therefore must exercise his mind rather than strain his muscles,

when he has to operate with it. In cautious hands it gives every facility that could be desired, and is both more certain in its action, and more expeditious in its results than anything of the kind which we at present possess, besides having the further advantage of not requiring those adjustments and unsatisfactory changes which the common instruments necessitate to be made. For extraction, nothing beyond these forceps is wanted: they answer every purpose; but the veterinary surgeon is less frequently called upon to extract, than to shorten the horse's teeth. To this subject Mr. Gowing has likewise given his attention, and it is pleasant to state he has equally succeeded. The ordinary chisel was alike inefficient and dangerous. The guard was not sufficient to prevent the edge from seriously wounding the mouth, and the chisel could remove but a small portion at a time. The shock, moreover, was sustained by the tooth itself, which, transferring the force to the alveolar cavity, was too often the cause of fracture. When cautiously conducted, the operation was tedious, and the struggles of the horse were not devoid of danger. We were possessed of nothing which, at a single blow, could remove

the entire bulk of a projecting tooth. To supply this desideratum was Mr. Gowing's object, and the annexed wood-cut will, at a glance, convince the reader that the requirement has been satisfactorily complied with.



A long cylindrical tube, of sufficient stoutness to afford the requisite strength, forms the handle of this instrument, and being hollow, permits a chisel to work freely within it. Indeed the chisel would work too freely if some means were not employed to steady it, therefore a large bulb, which is filled with packing and constitutes a stuffing box, is fixed at one end, and by pressing against the shaft of the chisel prevents it from being too readily displaced; though at the same time it allows of the cutting agent being propelled, with all the force that could be desired. The bulb likewise serves another purpose, as it gives the operator a firm grasp, and prevents the danger of the hold being lost when the instrument is struck. At the opposite end of the handle there is a frame, the further part or base of which is sharp upon the

inner side ; within this frame the chisel plays, and by it therefore is securely guarded. When the instrument is used, the chisel is drawn back to about the extent represented in the foregoing wood-cut, and into the space thus created is introduced the projecting tooth, which consequently is encircled on every side, and both before and behind is between two cutting edges. The operator then firmly grasps the handle, and applies to it such force as he calculates will be sufficient to counteract the effect of that blow which he is about to deliver. With a hammer of adequate weight he now strikes the head of the chisel, and the tooth flies off. The operation is instantaneous, and so far it is an advantage ; but beyond this is the safety which accompanies it. The softer parts cannot be wounded, for the action is strictly circumscribed in every direction, but the main principle of the invention remains to be pointed out. However great may be the force employed, no sensible jar is communicated to the jaw. The writer has held between his fingers a tooth which has been divided with this instrument at a single blow, and the shock was so trivial as to be unworthy of any notice. The concussion is received upon the guard

resting against the hind part of the tooth, and beyond that annoyance which the accompanying sound may excite, the horse suffers no inconvenience. Fracture of the alveolar processes is rendered impossible, and the ease with which the instrument is applied, considerably enhances its value. It would, however, be of service only when the tooth was large, and the entire body projected above the level of the other molars. It is not unfrequent for portions of the grinders, worn into various angles, to present themselves, and to occasion very serious effects upon the health of the horse. To remove these is of no less importance than to cut off the more regular and larger substance; and Mr. Gowing has produced instruments capable of fulfilling these intentions. In the first place he has improved upon the old guarded chisel, concerning the danger and inefficiency of which, remarks have been already made.



In the old tool the cutting surface was small, being rarely more than three quarters of an inch broad,

and the blunt sides afforded rather a show of protection than any positive security. Mr. Gowing has increased the breadth needed to make the chisel useful, and he has also added two falling sides, that, dropping over the lateral surfaces of the molars, guide the instrument, which works as in a groove. More steadiness is thus obtained, and the operator, consequently, can act with decision. The new chisel, however, is not intended to be used alone; if singly employed, it might do some damage, and fracture almost as readily be induced as formerly. To prevent such an accident other aids were imperative, and perceiving this, the instrument, which the following wood-cut represents, was invented by Mr. Gowing.



It is carved, so as to be suited to the shape of the horse's mouth, and at one end has a handle, while at the other is a cutting edge, between two circular guards, which prevent any injury being done to the softer parts. When a shelving projection of tooth is to be removed, this instrument is introduced into the

mouth, and the sharp edge is lodged against the back of the tooth, when it is given to an assistant to hold, while the operator, taking the chisel, proceeds to employ it in the way before mentioned. The object here is two-fold. In the first place, the chisel is restrained or prevented from being urged against the posterior of the mouth by the stroke of the hammer; and in the next place, the concussion is received upon the instrument, and taken from the jaw. Sometimes when a tooth is loose, but not either of sufficient size, or fitting shape, for the application of the forceps, the sharp edge can be got to a certain degree behind, and under it, when by a wrenching action it can be either elevated or forced out. There are, however, cases in which none of the instruments hitherto described answer so well as might be wished. Frequently little pieces or sharp corners of teeth project, and to remove these, demands more variety of position on the part of the operator, than the previous instruments will admit of. To meet this difficulty, Mr. Gowing, who to the surgery of the teeth has devoted more study than any person has hitherto bestowed upon the subject, invented the instrument represented in the annexed wood-cut.



In principle it is similar to the one which preceded it, but the handle being at the side instead of above, it can be adapted to those irregularities which the former would not readily catch. The operator can move it about at his pleasure, and where nicety is required, he can, with it, take off particles, such as the previous instruments would not enable him to touch. It consists of a cutting edge, guarded on one side by the handle, and on the other by a rounded projection. In the manner of its application, it is similar to the last, and like that is held by an assistant when used in operation. For many points this is of much service, but in order to be prepared for every difficulty, a pair of them suited to the opposite sides are required. Possessed of these the veterinary surgeon has, for the first time, what may be regarded as a complete set of dental instruments, with which he can operate, with ease to himself, and without hazard to his patient. The

mouth rasp is all that he requires, in addition to what has been depicted; and thus armed, he can overcome obstacles which once bid defiance to his skill.

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