

On canine madness : comprising the symptoms, post-mortem appearances, nature, origin, and preventive and curative treatment of rabies in the dog, and other domestic animals / by W. Youatt.

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ON
Canine Madness;

COMPRISING THE
SYMPTOMS, POST-MORTEM APPEARANCES,
Nature, Origin,

AND
PREVENTIVE AND CURATIVE TREATMENT

OF
RABIES IN THE DOG,

AND OTHER DOMESTIC ANIMALS:

Being a Series of Papers published in "The Veterinarian," in
1828, 1829, and 1830.

BY W. YOUATT, V.S. & F.Z.S.

Lecturer on the Anatomy and Diseases of Domestic Animals, Joint Editor of "The Veterinarian," and Author of "The Horse," "Cattle," &c. in "The Farmer's Series" in the "Library of Useful Knowledge."

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1830.

Canine Pharyngitis;

CONTAINING THE
SYMPTOMS, CAUSES, AND TREATMENT,
WITH A HISTORY OF THE DISEASE IN THE
DOG.

BY
W. J. L. S. & F. S. & F. S.
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AT the suggestion of some partial friends, I have been induced, at this period of not unfounded alarm, to collect some papers on Rabies, which were scattered through the volumes of "THE VETERINARIAN." Engagements of a kindred and important nature prevent me, at the present moment, from doing little more than reprint them. At some future, but perhaps distant time (for an almost unbounded field of experiment lies before me), I shall probably, if life and health remain, venture to lay before the public a more systematic, and enlarged, and better treatise on this very important subject. In the mean time, I trust that this little pamphlet may not be uninteresting, and, with all its faults, not unuseful to the medical profession and the community.

19th June, 1830.

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15th June, 1830.

ON
CANINE MADNESS.

FIRST PAPER, VETERINARIAN, Vol. i, p. 28.

The Symptoms of Rabies in the Dog.

THE earliest symptoms of madness in the dog are sullenness; fidgetiness; continued shifting of posture; a steadfast gaze, expressing suspicion; but, when directed on the master, soon clearing up, and followed by some action indicating affection.

An earnest licking of some part, on which a scar is generally found. If the ear be the affected part, the dog is incessantly and violently scratching it. If it be the foot, he gnaws it until the integument is destroyed. He gets into a passion with it, and growls over it; and is so insensible to pain, that in one case the foot was dreadfully mangled, and in another the greater part of the penis was gnawed away.

Considerable costiveness, occasional vomiting, and a depraved appetite are very early found; bits of thread, hair, straw, dung, are picked up; and frequently the dog will lap his own urine, and devour his own excrement. The animal next becomes irritable; flies fiercely at strangers; mumbles the hand or foot of his master; is impatient of correction; seizes the stick of a whip; quarrels with his own companions; eagerly hunts out and worries the cats; demolishes his bed or carpet; gnaws and shakes his chain; makes the most violent efforts to escape; tears to pieces his kennel or the door by which he is confined, and sometimes breaks his tushes in the attempt. If he escapes he usually attacks those dogs only that fall in his way; or, if naturally ferocious, he will diligently and perseveringly seek his prey. He will overcome every obstacle to

effect his purpose; and at length returns to his home completely exhausted.

The desire to do mischief depends much on his previous disposition: it often proceeds not beyond an occasional snap, and then only when purposely irritated: but with the fighting-dog the scene is terrific; he springs to the end of his chain; he darts with ferocity at some object which he conceives to be within his reach; and is eagerly employed in destroying every thing around him.

Very early in the disease the expression of the countenance is changed. The conjunctiva is occasionally highly injected, at other times scarcely affected; but the eyes have a peculiarly bright and dazzling appearance, accompanied by a slight strabismus; not the protrusion of the membrana nictitans as in distemper, but an actual distortion from the natural axis of the eye: the lids of one eye are frequently contracted; twitchings begin around that eye, and gradually spread over the face.

About the second day a considerable discharge of saliva commences; but this does not continue more than ten or twelve hours, and is succeeded by an insatiable thirst: the dog is incessantly drinking or attempting to drink; he plunges his muzzle into the water. When the flow of saliva has ceased he appears to be annoyed by some viscid matter in the fauces; and, in the most eager and extraordinary manner, works with his paws at the corner of his mouth to get rid of it; and, while thus employed, frequently loses his balance and rolls over.

A loss of power over the voluntary muscles is now observed. It begins with the lower jaw, which hangs down, and the mouth is partially open, but by a sudden effort the dog can sometimes close it, although occasionally the paralysis is complete. The tongue is affected in a less degree: it protrudes from the mouth, and becomes of a leaden colour. The dog is able, however, to use it in the act of lapping, but the mouth is not sufficiently closed to retain the water; therefore while he hangs over the fluid, eagerly lapping for several minutes, it is very little or not at all diminished. He

catches at his food with an eager and ill-directed snap, and often fails in his attempt to seize it; he bolts it unchewed, or drops it in the act of chewing. In the more advanced stage of the disease this paralysis frequently disappears from the head, and attacks the loins and extremities. A peculiar indecision attends every motion; the animal staggers about, and frequently falls. Previous to this he is in almost incessant action: he scrapes his bed together, and disposes it in various forms; he starts up and eagerly gazes at some real or imaginary object; he traces the fancied path of something floating around him; he fixes his eye intently on some spot on the wall or partition; he suddenly plunges at it; his eyes then close and his head droops; in an instant he starts and gazes wildly around. The voice of his master recalls him from this delirium; he acknowledges him, and endeavours to fondle on him, but in a moment he is wandering again.

He frequently, with his head erect, utters a short and very peculiar howl; or, if he barks, it is a hoarse inward sound, altogether dissimilar from his usual tone, and generally terminating with this characteristic howl. Respiration is always affected; often the breathing is very laborious, and the *inspiration* is attended with a very singular, grating, choaking noise. On the fourth, fifth, or sixth day of the disease, he dies; occasionally in slight convulsions, but oftener without a struggle.

Of the symptoms, popularly but erroneously supposed to accompany rabies, I will only say, that the rabid dog never has fits: the existence of epilepsy is a clear proof that there is no rabies. There is *no dread of water; no spasm attending the effort to swallow*; but a most extraordinary and unquenchable thirst. There is *no fear excited in other dogs;—no wondrous instinct warning them of danger*. There is *no peculiar and offensive smell; no running with the tail between the legs*, except, when weary and exhausted, he is seeking his home; *no pustules in or near the frænum of the tongue*.

SECOND PAPER, VETERINARIAN, vol. i, p. 62.

The Post-mortem Appearances.

THE tongue is usually swelled, discoloured on the dorsum, varying from a dark red to a dingy purple, more red mingling towards the point and edges. The papillæ near the root of the tongue are very prominent. The sublingual glands are generally enlarged, with appearances of inflammation; and the lesser glands under the membrane of the mouth likewise tumefied. I suspect that an occasional enlargement of these has been mistaken for pustules. There is no particular redness or engorgement of or about the frænulum linguæ, whether the dog has or has not been wormed. All the glands concerned in the secretion of saliva are increased in size and vascularity. Some inflammatory appearance extends over the arch of the palate, and the whole of the fauces. The tonsils are enlarged, and sometimes considerably inflamed. I do not recollect a single case in which the tonsils have not been affected; and to this affection of the tonsils, and probable deficiency of mucus to lubricate the passage to the throat, I partly attribute the insatiable thirst of the rabid dog.

The minute vessels on the back of the epiglottis are injected; sometimes merely a few ramifications; occasionally a beautiful net-work of vessels. When there is much injection upon the epiglottis, the membrane covering the arytenoid cartilage is likewise vascular. The edge of the epiglottis is frequently thickened.

There is intense and never-failing inflammation at the angle at the back of the larynx, behind the epiglottis. The appearances presented by the trachea are very uncertain, varying from the deepest inflammation, and that extending even to the bronchiæ, to a perfect freedom from unusual vascularity. The membrane of the bronchiæ is occasionally highly inflamed, and the bronchial passages and the lower part of the trachea filled with a viscid or bloody spume;

but this, contrary to the opinion of some continental writers, comparatively seldom occurs, and is not characteristic of the disease.

In a few instances there is inflammation of the substance of the lungs; more rarely congestion, with very singular patches of inflammation on the pleuræ, and, sometimes, on the pleura of one lung only.

The œsophagus is rarely affected; the stomach invariably. There is vascularity and redness; in some cases confined to the rugæ, and not much exceeding the blush upon the healthy stomach during digestion; but more frequently descending between the rugæ, and occupying a considerable portion of the mucous coat. Confined occasionally to the cardiac portion, or more intense there; but, in a few instances, extending, and with the deepest intensity, over the whole of the stomach. Spots of ecchymosis, varying from the magnitude of a pin's head to that of a large pea, are very generally but not invariably found. They appear in a few cases, where the slight degree of inflammation would not warrant the expectation of them; and they never fail to accompany deep and general inflammation. These spots contain a central depression, often sinking deep into the coats of the stomach. A variable quantity of indigesta is found in the stomach; not the grass eagerly sought for by dogs in health, nor the bits of stick, or small stones, or pieces of coal, swallowed by puppies during the period of dentition; nor the excrement eaten by some dogs, and particularly by spaniels, under the influence of a depraved appetite; but a strangely mingled mass of straw, hay, hair, *horse-dung*, and earth. In some instances the stomach is perfectly distended with these substances, and which occupy even the duodenum and jejunum.

When no indigesta are found, there is a fluid resembling the deepest chocolate mingled with olive, and staining the mucous coat; or, still darker, like coffee, yet communicating no stain. When neither the indigesta nor the fluid appear, it will be discovered, on inquiry, that the dog has vomited much hair, hay, and straw.

The outer vessels of the stomach are usually turgid.

If there be much inflammation of the stomach, it extends to the duodenum, and, occasionally to the small intestines; but in no case is there the slightest discharge of blood from the vessels of the mucous coat.

If the inflammation of the stomach be slight, the bowels are not affected.

The other abdominal viscera present no peculiar morbid appearance.

If much fever has attended the progress of the disease, the parietes of the ventricles of the heart exhibit the deep colour of carditis, and spots of ecchymosis are found upon the membranes lining the ventricles; but, in most cases, no vestige of disease can be traced in the heart.

The brain will usually display some vascularity of the membranes, particularly of the pia mater: the degree of this vascularity depending on the previous phrenitis; when the animal has exhibited no great ferocity or delirium, little inflammation of the meninges appearing. I have never seen much increased vascularity of the cerebral substance.

In every case the medulla oblongata is affected. Occasionally there is injection of the membranes, and curiously marked, when compared with a portion of the spinal cord below or the cerebral mass above. The substance of the medulla oblongata, and especially of the corpora olivaria, generally presents increased vascularity. Minute specks of blood follow the scalpel, and the greyish yellow of the corpus olivarium has a slight hue of pink mingled with it.

I have seen vascularity of the membranes through the whole of the spinal cord, and, in a few instances, this vascularity has increased about the lumbar region; but, generally speaking, no decisive trace of disease is to be found in any part of the vertebral canal.

THIRD PAPER, VETERINARIAN, Vol. i, p. 139.

The Symptoms of Rabies in the Horse, the Ox, the Sheep, the Swine, the Cat, and the Human Being—why Hydrophobia in the Man, and not in the Brute.

I HAVE described the symptoms and post-mortem appearances of rabies in the dog. They must now be considered in other domestic animals.

However my readers may hereafter differ from me as to the occasional cause of rabies in the dog, there will be no dispute that it is produced in the horse by inoculation alone.

Its attack in that animal is most sudden. He will go out apparently well; all at once he will stop, tremble, heave, paw, stagger, and fall. Almost immediately he will rise, draw his load a little farther, again stop, look about him, back, stagger, and fall.

This can scarcely be confounded with megrims, for the horse is not for a single moment insensible; and, after seemingly recovering, possibly falls twice or thrice before he can be led home. The sooner he is led home the better; for the progress of the disease is as rapid as the first attack is sudden.

In many cases, perhaps the majority of them, a state of the highest excitation speedily ensues; the horse kicks and plunges in the most violent manner, he is then quiet for a while, recognizes his attendant, is sensible to his caresses, and looks most piteously at him. A rabid horse, belonging to Mr. Kent, pressed his head repeatedly against me; then, without the slightest notice, he plunged and fell.

Sometimes he is mischievously disposed; he will furiously seize and bite other horses, and even his attendants; and, as Mr. Blaine well describes it, "will level with the ground every thing before him, himself sweating, and snorting, and foaming amidst the ruins."

Staggering and palsy of the hinder extremities soon succeed. I once saw a mare sitting on her haunches, and unable to rise, yet pawing furiously with her fore feet. The disease, however, quickly runs its course, and rarely extends beyond the third day. In two cases I fancied I saw something very much resembling hydrophobia. The thirst was excessive, but the act of swallowing was performed with a forced gulping effort, and suddenly the head was snatched from the pail with a strange contraction, a kind of risus sardonicus of the lips.

In Mr. Kent's horse there was a peculiarity which I have in no other case seen, and which no author has described. The owner would not have him destroyed, and we slung him in an early stage of the disease. He had been bitten in the near leg, behind. When I approached him on that side the poor animal was agitated, and trembled, and struggled as well as he could, and if I touched him with only my finger, the pulsations were quickened more than ten beats a minute. When I went round to the off-side, he permitted me to pat him, and even sought my notice.

In every case in which I have had opportunity to examine the animal after death, I have found inflammation on the epiglottis, and generally in the trachea. There has uniformly been inflammation in the stomach, and on the lungs, and in patches, as in the dog. Either the membranes or substance of the medulla oblongata have always been injected.

I have seen but one rabid ox. His disease commenced with loss of appetite and dulness; but it soon changed to the most dreadful state of excitation. When I saw him he was standing across a path in a meadow, bellowing incessantly, and tearing up the ground with his horns. I believe, however, that much ferocity does not usually accompany rabies in the ox. The eyes are anxious, protruding, and red. The appetite is lost. There is a considerable discharge of saliva in the early stage of the disease, and when that ceases, insatiable thirst follows. There is no hydrophobia. The animal frequently and pitifully lows.

A distressing tenesmus. Weakness of the loins and staggering early appear, and are succeeded on the third or fourth day by palsy of the hinder extremities. The animal lingers on six or seven days, and usually dies without a struggle.

The post-mortem appearances in the pharynx very much resemble those in the horse. Both the membranes and substance of the medulla oblongata were injected in the case which I saw; but the stomachs were perfectly free from inflammation. I inoculated a dog with the saliva of this ox, and he died rabid.

In sheep the character and progress of the disease are not very different. The thirst is as great, and no hydrophobia. The same constant tenesmus, weakness of the loins, and subsequent palsy are observed. There is never in the ox, and rarely in the sheep, any disposition to bite; but sheep are very irritable, and make frequent and effectual use of their horns. In the male of both there is, in the early stage, an excessive desire of venery. Death ensues about the fifth day. The appearances on dissection resemble those in the ox.

In swine the character of the disease is as uncertain as it is in the dog. Some are exceedingly ferocious, running at every person, gnawing and shaking their troughs, dashing themselves against a wall, or endeavouring to spring over it. Others content themselves with harmless and ludicrous antics. They snuff the air, and gallop round and round, uttering a strange and shrill squeak. Generally however they are quiet; they refuse their food, are eager for water, stagger when they attempt to rise, become paralytic, and die about the fourth or fifth day. There is no hydrophobia.

In the ox, sheep, and swine, there is occasionally not so marked, but sufficiently evident, the peculiar delirium by which rabies is characterized in the dog.

After death there is usually inflammation about the glottis in swine; uniformly considerable inflammation of the stomach, and but little, or scarcely distinguishable, of the membranes of the medulla oblongata.

I have never seen a rabid cat; but I understand that it is a most dangerous animal*. It will not attack the human being or the quadruped without provocation; but it is exceedingly irritable, and, at the slightest offence, will seize the hand, or dart at the throat, and use both nails and teeth with dreadful effect.

To make our subject complete, I will briefly state the usual symptoms in the human being.

Pain in the bitten part is an early symptom in very many cases. To this succeed lassitude, fever, anxiety, irritability, horror at the sight of water, and the attempt to drink it accompanied by dreadful spasms. A strong inspiration, without the sight or even thought of fluids, will generally produce the same spasm.

The irritability increases and becomes excessive. The poor sufferer cannot bear the least motion around him, or the slightest wind to blow upon him. There is an inordinate and irregular and perverted action of the voluntary muscles. Every motion is performed with a hurried start, and uncertainty of effect. The eyes roll unconsciously in search of some imaginary object. A delirium comes on different from that which accompanies any other disease. The patient fancies that he is surrounded by persons far distant from him. He converses with them of things long gone by; or he abuses them with the most violent gesticulation; but with a word he is in a moment recalled to himself. The next minute he wanders again. He occasionally vomits bilious matter. He is oppressed by viscid saliva which adheres to the fauces, and which, with the most violent efforts, he strives to throw from him.

Subsequently all the symptoms relax. He is able to swallow, but the powers of the constitution have been destroyed, and death ensues.

Of the appearances on dissection I am unable to speak. Some surgeons maintain that not the slightest trace of disease can be found in the thoracic or abdominal viscera, and only the usual characteristics of phrenitis in the cere-

* I have seen two since this paper was written, and was severely bitten by one of them, which sprung upon me like a tiger.

brum. Others give an account of injection of the membrane covering the glottis, and redness of the mucous coat of the stomach, with spots of ecchymosis; and inflammation of the membranes of the medulla oblongata, or portions or the whole of the spinal cord. I must not presume to decide who is right, or whether all are so; but I acknowledge, that when the same medical men who find no morbid appearance in the human being, find none likewise in the brute, I do wonder with great amazement.

The symptoms of rabies are very similar in man, and in all our domesticated quadrupeds. In all there is the same affection of the respiratory nerves; the same howling, or at least choaking noise; the same excessive excitability, and incessant and uncertain action; the same singular delirium, affection of the stomach, and discharge of saliva; the same inevitably fatal termination of the disease; and, I am disposed to believe, nearly the same morbid appearances after death.

The human being, however, has a dread of water, which the quadruped has not. It is true that the dog is unable to swallow, but he flies eagerly to the water; and all other quadrupeds, with perhaps an occasional exception in the horse, drink with ease and with increased avidity.

How is this? Are they different diseases? Is hydrophobia in the human being the creature of imagination?

A dog labouring under a disease attended with certain symptoms bites a man, or a child in whom the power of imagination has not yet been awakened. In process of time he is attacked by a malady, accompanied by characters very similar, but to which another peculiar symptom is superadded. The dog died. The man or the child likewise died, in despite of all medical care and skill.

Are we to expect that the same symptoms shall accompany the same disorder in every animal? Are the characters always the same in the same animal?

Difference in structure produces variations of disease quite as remarkable as that which we are now considering. The inflammatory fever of cattle and sheep often runs its course in two or three hours. The hoven of cattle is

unlike tympanitis in any other animal. The stomach-staggers of the horse bear little resemblance to repletion or over-distention of the stomach in other patients. Psora, or mange in the horse, the dog, and the sheep are very unlike. Affections of the chest, and their symptoms, duration, and termination are dissimilar in the biped and the quadruped, and in different quadrupeds.

Not only do the symptoms of disease vary, but some animals are subject to certain maladies from which others are exempt. The horse has glanders, farcy, grease, and periodical ophthalmia. The mule has rarely, and the ass never has, strangles; and both of them escape the torture of contracted feet. Cattle, sheep, dogs, swine, know not any of these complaints.

The human being has, peculiar to himself, variola, scarlatina, and syphilis.

Need we, then, wonder that there should be considerable dissimilarity in rabies?

Possibly a little reflection will lead us to expect some difference, and precisely of the kind which we observe.

Hydrophobia, the dread of water, and the horrible spasms which accompany the attempt to swallow any fluid, depend on the highly irritable state of the fauces and larynx.

The larynx is the guard of the trachea during the act of deglutition. The epiglottis is then pressed down upon the orifice of the larynx, and the crico-arytenoidei muscles contract, and accurately close the aperture.

The larynx likewise discharges a more important function. It is the principal organ of voice. According to the number of vibrations performed by the chordæ vocales in the act of expiration, is the precise tone uttered. A certain number of vibrations will produce a certain note. If the vibrations are quickened, the note assumes a higher place on the musical scale. If the number is lessened, the tone is proportionably graver or lower. The human voice is capable of nearly 500 different intonations, and each is produced by a determinate number of vibrations; and these vibrations, the number continuing the same, are

modified, partly by the mechanism of the fauces and mouth, but more by the larynx, to express every varying emotion and passion. The larynx, then, must be possessed of exquisite sensibility, to obey so rapidly, and with such strict and almost inconceivable accuracy, the mandates of the will.

The voice of quadrupeds is more confined. There are fewer differences of intonation, and the expression of passion is more simple. This exquisite sensibility will not be needed in them. It is a law of nature, that where extraordinary function is required, extraordinary sensibility and power are bestowed; but if the function is simple, and the work easily accomplished, less feeling and less energy are supplied. This is benevolent and wise. Quadrupeds have also a mechanism peculiar to each, and in a great measure independent of the glottis. The horse has a falciform membrane, attached by its middle to the thyroid cartilage, and its extremities extending to the margin of the rima glottidis. The ass has a similar apparatus, with an excavation under the thyroid cartilage, and two membranous sacs. The cat has a delicate membrane under the ligament of the glottis. The swine has membranous bags of a considerable size; and the ventriculi laryngis of the dog are very large.

With this additional mechanism for the production of the voice, the extreme sensibility of the human larynx is not required; and nature bestows not that which the necessity of the animal does not demand.

Considerable affection, however, of these parts attends every case of rabies in the dog. The involuntary and peculiar howl, the choaking noise attendant on each respiration, and the blush of inflammation, more or less intense, which every dissection presents, sufficiently evince it.

If we do not observe the dreadful spasms by which the human being is tortured, let it be remembered that these spasms are rarely excited by the passage of solid food. Fluids alone have this power, from their being brought into more intimate contact with the inflamed and irritable surface.

It can easily be imagined, that the decreased sensibility which accompanies more limited and simple function would render those membranes not only indifferent to the passage of solids, but unaffected even by fluids.

The mystery, therefore, is, in some degree, unravelled; and we not only cease to be surprised that rabies should be characterized by hydrophobia in the human subject, while there is no dread of water in the brute; but a consideration of the structure and functions of the larynx in man and the inferior animals leads us to expect that something like this will occur.

FOURTH PAPER, VETERINARIAN, Vol. 1, p. 153.

Rabies an Affection of the Respiratory System of Nerves—caused by Inoculation alone—the Virus must be received on some abraded, or wounded, or mucous surface—the Virus resides in the Saliva alone—the Power of the Virus dies with the Animal.

THE symptoms which have been described clearly indicate that rabies is a nervous affection, and particularly an affection of the respiratory system of nerves, or those which are employed in the instinctive and involuntary actions connected with respiration, and which serve to associate many of the voluntary muscles in the discharge of the same function. These nerves arise from the medulla oblongata, in which, or on its membranes, inflammation is almost invariably detected. They do not spring from the same columns with the other spinal nerves; and they have roots peculiarly constructed, and following one another in an uniform line, as if they were leagued in the performance of the same office.

They are the portio dura of the seventh pair, distributed over the face; the glosso-pharyngeus, which supplies the pharynx and the tongue; the par vagum, wandering to the pharynx, the larynx, the heart, the lungs, and the stomach; the recurrent, ramifying on the muscles of the larynx, and the membrane of the glottis; and the spinal-accessory given to the neck and shoulder, and reaching even to the loins.

The twitchings and contraction of the eyelids, the strabismus, the spasms of the cheek, and lips, and face, and

the paralysis of the muscles of the lower jaw, sufficiently prove an affection of the portio dura.

The protrusion of the tongue, the enlargement of the sublingual and other glands, the inability to swallow, and the alteration of the voice, implicate the glosso-pharyngeus.

The increased circulation, the laborious respiration, the peculiar inflammation of the pleura, and the constant and often intense inflammation of the stomach, are attributable to the par vagum.

The involuntary barking, the husky grating inspiration, the frequent inflammation of the trachea, the uniform inflammation of some part of the glottis in the quadruped; and the dreadful excitation of the membrane of the glottis, with all the horrors of hydrophobia in the human being, testify that the recurrent nerve has not escaped: while the hurried and uncertain action of the fore extremities, and the palsy of the region of the loins, are clearly to be traced to the spinal-accessory.

These nerves anastamose freely with the cerebral nerves, therefore cerebral affection soon occurs. There is a state of general and extreme excitation, a very peculiar wandering and delirium, and, in some animals, fits of savage and uncontrolable ferocity.

They likewise unite and blend with the ganglionic nerves, and thence proceeds altered secretion—a morbid secretion of the gastric juice occasioning the strangely perverted appetite of the dog; and a still more depraved secretion of the saliva, converting that bland and innocuous fluid into the direst poison. To this it might have been added, that, although the phrenic nerve, which supplies the diaphragm, has its origin from the fourth cervical nerve, it is very intimately connected with those from the medulla oblongata. Not far distant from its root it gives branches to the par vagum, and to the linguelis medius, and likewise, which is of most importance, as connecting the action of the diaphragm with certain affections of the larynx, a branch is given off from it to that organ, after which it has communication with no other part, but the main trunk descends to the diaphragm, and expands itself completely on that mus-

cle. Mr. C. Bell, to whom we are indebted for the only satisfactory explication of the nervous system, is of opinion that the phrenic nerve, though coming out with the cervical nerves, does in all probability take its origin from the same portion of the medulla spinalis with the accessory nerve.

Dr. Parry approached the subject when he asserted that it was principally an affection of the *organs* of respiration*. The circumstances which I have stated seem to prove, that it is a disease not so much of the *organs* of respiration as of those nerves which bind together numerous portions of the frame in the discharge of that function.

What is the cause of this sad disease? The saliva of a rabid animal received into a wound, or on an abraded or mucous surface.

Hydrophobia has been produced in the human subject by the power of imagination, or by strong excitement; but the disease has materially differed from rabies in its symptoms, progress, and termination.

No one, I fancy, will deny, that in man, in the horse, in cattle, sheep, and swine, rabies is caused by inoculation alone; but it is said to be spontaneous in the dog and his varieties. If, however, its spontaneous origin be denied in so many animals, where is the proof that it arises in any animal without the contact of the rabid virus? Heat, thirst, and putrid meat, are supposed to be exciting causes. Scarcely a week passes during the summer season without some earnest exhortation from the sage editors of the daily press, to give our dogs plenty of water. I would ask for one authenticated instance in which rabies has been produced by the most highly putrid meat, by extremity of thirst, or even by the heat of a vertical sun.

Rabies occurs almost as frequently in the spring, the autumn, and even the winter, as it does in summer.

* Let his uncandid review, and gross mis-statement of some cases published by me 15 years ago, be now forgotten. The wound rankled for a while, and the more so, as inflicted by the friend and fellow-student of my father. He now sleeps in peace. He was a scientific practitioner, and a good man.

At the Veterinary School at Alfort, three dogs were selected as the subjects of some very cruel but decisive experiments. It was during the heat of summer, and they were all chained in the full blaze of the sun. To one, salted meat alone was given; to the second, water only; and to the third, neither food nor drink. They all died; but not one of them exhibited the slightest symptom of rabies.

Am I asked,—If the disease be now propagated from dog to dog by inoculation alone, whence did it at first arise? I should not entertain a very high opinion of the querist; nor should I be in haste to answer him, until he had told me whence arose rubeola, variola, or syphilis. They sprung from some unknown morbid action, and, having once spontaneously arisen, each is now propagated in its own way.

But are there not some diseases communicable by contact, and yet generated also? Most certainly there are. Glanders in the horse and distemper in the dog are both generated and communicated.

One thing, however, is certain—that every disease is governed by its own laws. The cow-pox, glanders, and syphilis are communicable only by the contact of the virus with an abraded or mucous surface. The small-pox, and distemper, and malignant fevers, by the halitus, or through the medium of effluvia, or by the slightest contact, as well as by inoculation. Psora, glanders, distemper may be communicated or bred. Syphilis, the measles, the small-pox, the scarlet fever, are never generated. Each has its own mode of action, and is governed by its own laws; and experience alone can determine what those laws are. That which is known of one disease, cannot with certainty be predicated of any other. Reasoning from analogy is here dangerous and inadmissible. We appeal to facts, and to facts alone we bow.

There is no disease of which earlier mention is made than of rabies. In the records of three thousand years ago we read of the rabid or mad dog. The malady, however, is yet confined to certain parts of the globe. It has spread

where it could be conveyed by inoculation. Where there were no means, or difficult means of communication, it was not diffused. It has not yet found its way to the West Indian islands, or the Indian Archipelago, or Syria, or Egypt, or the south of Africa, or any part of the continent of South America*. The unfortunate dogs are tortured with heat, and thirst, and starvation. They are exposed to every probable and every possible cause of rabies, yet the disease is unknown.

Dr. Heineken tells us, that curs of the most wretched description abound in the island of Madeira: that they are afflicted with almost every disease; tormented by flies, and heat, and thirst, and famine, yet no rabid dog was ever seen there.

No one will affirm that rabies is caused by a particular state of the atmosphere. It occurs at all times of the year, and in all variations of moisture and temperature. In many countries it has long committed its destructive ravages; but in others, placed in the same latitude, with a similar temperature and climate, and where every predisposing or exciting cause has been, so far as we can judge, the same, it has never appeared.

In nineteen cases out of twenty the inoculation can be proved. In almost every case the possibility of it cannot be denied. Who, under circumstances of peculiar excitement, has not possessed many times his usual strength? The dog, labouring under the dreadful excitation of rabies,

* M. Unaneu gives a strange account of the supposed ravages of hydrophobia, on which, even if the facts were to be depended upon, no comment need be made. "Hydrophobia appeared for the first time in the summer of 1804, in the north of Peru, during an excessive heat, during which Fahrenheit's thermometer was sometimes at $99\frac{1}{2}^{\circ}$. Nearly all the animals were seized with madness, especially dogs. It was only in 1807 that it appeared in the capital. In the town of Jea 42 persons died of the bites of rabid dogs. On the north coast the disease developed itself spontaneously in several individuals. In 1808 the disease disappeared. In some dogs the disease made its appearance twice; but a bite from the animal with the second attack was not followed by any serious consequences."

and bent on the work of destruction; will overcome obstacles which would at other times be insurmountable.

During the life of the late Duchess of York, a mad dog wandered into Oatlands Park, and penetrated into divisions of the menagerie to which it would have been thought magic alone could have conveyed him. He was destroyed in one of the divisions into which, the gate being closed, I should have said that it was impracticable for man or beast to have entered.

Some dogs, however, are rarely out of their owner's sight. Even in this case I can easily conceive the possibility of inoculation. There is no battle. It is, in the great majority of instances, one simple bite. The object of the animal is not to contend for victory, or to worry his antagonist. He acts from an irrepressible impulse, and, the mischief being effected, pursues his course. I can believe, that if a favourite dog has but for a moment lagged behind, the injury may be inflicted without the owner's observation; or, that the trifling, every-day occurrence of two dogs snarling and snapping at each other, may be soon forgotten. Did the disease immediately follow the bite the short contention might be remembered; but weeks and months intervene, and he must have a retentive memory, or nothing else to think about, who will invariably, and long afterwards, recollect circumstances so trivial.

I am purposely labouring this part of the subject, because it must form the proper ground for the interference of the legislature, at no distant period, to restrain the ravages of this dreadful disease, which has most alarmingly increased, and is yearly increasing. If the account here given of the origin of rabies be correct, the preventive measure is not difficult to imagine.

The rabid virus must be received on some abraded, or wounded, or mucous surface. On the sound integument it is harmless. There are a thousand proofs of this. Almost every author acknowledges it; and the writer of this essay has, with perfect impunity, had his hands many times covered with the saliva of the mad dog.

I have said that the virus must be received on an abraded

or mucous surface. The case, however, is not so clear with regard to the latter. A father, in the last stage of rabies, imprinted a parting kiss on the lips of his child; the infant died hydrophobous. A maiden would not be parted from her lover, and lavished on him her caresses, and escaped. The lips of the child might be chapped, those of the young woman might be unbroken.

A man endeavoured to untie with his teeth a knot that had been firmly drawn in a cord. Eight weeks afterwards he perished, undeniably rabid. It was then recollected, that with this cord a mad dog had been confined. A woman was attacked by a rabid dog, and escaped with the laceration of her gown. In the act of mending it, she thoughtlessly pressed down the seam with her teeth. She died. A physician, attached to a faithful spaniel on which symptoms of rabies were too apparent, ordered it to be destroyed; but, with pardonable weakness, he first kissed the poor animal. He paid the penalty of his imprudence with his life.

There is a strong attachment between the Danish dog and the carriage horse. It is pleasing to witness the interchange of caresses between them. Not even under the strongest excitement of rabies will this dog bite his companion and friend; but I know more than a dozen instances in which the Dalmatian has died rabid, and the horse has speedily followed him.

Bread, smeared with the saliva of a rabid dog, has been eaten by another dog without the slightest bad consequence; but two horses that had been suffered to devour the litter on which some rabid pigs had lain were lost.

This is a question, then, which cannot be perfectly decided. It is possible that the lips of those who unfortunately perished might have been abraded; but I confess, that the strong inclination of my opinion is, that the virus cannot be received on a mucous surface without imminent danger. Syphilis and glanders are much more frequently communicated by contact with a mucous than an abraded surface.

In what secretion of the rabid animal does the virus reside? In the saliva, and in that alone.

Some authors, describing the post-mortem appearances of rabies in the quadruped, have asserted that there is no inflammation or enlargement of the salivary glands. I can only say, that this is contrary to my experience. The parotid and sublingual glands have been almost invariably affected, and frequently the submaxillary.

Trollet imagines that the mucus secreted in the bronchial passages is vitiated, and communicates the disease. I have seen considerable inflammation of the bronchiæ, and the passages have then been filled with viscid, and, occasionally, bloody spume; but, in the majority of instances, there has been no injection of the membrane, or undue secretion of mucus. The proper test would be, to inoculate with the spume from the bronchial tubes. M. Trollet has not done this; and I take some shame to myself for losing several opportunities of setting this question at rest.

At an uncertain, but not late period of the disease, there is an increased secretion of saliva, apparently of the natural consistence; in four-and-twenty hours it becomes more inspissated, and then begins to irritate the fauces, either by adhering to them, or by the acrimony which it acquires. At that stage of the disease, when the dog fights at the corners of his mouth to get rid of something which dreadfully annoys him, the secretion of saliva does not exceed its usual quantity, but is more viscid or acrid.

Does the rabid virus retain its energy after the death of the animal? This is an interesting question to the veterinary surgeon, who is so often called on to examine the rabid animal, and it does not appear to have been sufficiently examined into. Indeed, it has seldom been mooted. Medical men have taken it for granted, that the disease might be communicated by the saliva with equal certainty before and after the death of the dog. As opportunity serves, this shall be put to the test of repeated experiment.

My present belief is, that the power of the virus ceases

with the life of the animal. At all events, I have hitherto escaped, although, in many dissections the saliva, notwithstanding considerable care, must have come into abundant contact with my hands, and they were not always sound.

FIFTH PAPER, VETERINARIAN, Vol. i, p. 281.

The Virus of every Rabid Animal will communicate the Disease—comparative predisposition to take on the Disease—Nature of the Virus—it lies for an uncertain period dormant in the Wound—Period between the Bite and the Appearance of the Disease.

I THINK we are justified in concluding, from the foregoing statement, that rabies is produced by inoculation alone, and that the virus is confined to the saliva.

The virus of every rabid animal will communicate the disease. It is chiefly propagated by the dog, because with him the teeth are the natural weapons of offence; and, when labouring under this malady, he has a strange and irrepressible disposition to bite. He is likewise most exposed to inoculation; and there would seem to be in him a peculiar aptitude to take on the disease.

The saliva of the cat, the fox, the badger, the wolf, the horse, the pig, the human being, have undoubtedly produced rabies; and some say that it has been propagated even by the hen and the duck.

Veterinarians should therefore be careful how they administer medicine, where there is the slightest reason to suspect the existence of rabies. If the hands be not perfectly sound (and of that we cannot be always sure) the mouth of the animal should be carefully avoided. Many farriers have perished from ignorantly or foolhardily drenching or balling a rabid dog; and a groom, not long ago, became hydrophobous from a scratch which he received in administering a ball to a horse.

The virus does not appear to have the same effect on all animals. Two dogs out of three, bitten by one that is rabid, become rabid. The majority of horses inoculated with the virus perish. Cattle have more chance. The skin is looser, and less easily penetrated. A full half of

those who were seized by a mad dog would escape. With sheep the bite is even less dangerous. The tooth has perhaps been cleaned in its passage through the wool. Not more than one in three who had been attacked by a rabid dog would be affected.

The human being is least of all in danger. Mr. John Hunter supposed that, if twenty persons were bitten, probably not more than one would become hydrophobous. This, however, is calculating far too highly the chance of escape. We have many accounts of the dreadful ravages of this disease in other countries. M. Trollet tells us, in his valuable "*Traité de la Rage*," that in May, 1817, twenty-three persons were bitten by a rabid wolf, of whom no less than fourteen died, in defiance of all preventive means. In 1827, two persons were bitten by a rabid dog in the neighbourhood of Ball's Pond: one of them was lost, although operated on by a very skilful surgeon. Two years before, a Newfoundland dog was sent to my residence, evidently unwell, but the nature of the malady not suspected. There was either something very deceptive in the case, or my assistant was unpardonably careless. The animal was dismissed with a little physic. On the next day rabies was sufficiently developed. One person only was bitten, but the poor fellow became hydrophobous.

There can be no doubt, however, that the decided majority escape, even if no means, or those which are inert and insufficient, are adopted. Hence the falsely-acquired reputation of so many prophylactics.

This immunity depends on various circumstances. The bitten part may be covered by woollen clothes; in passing through them, the tooth may be perfectly freed from the virus. Most of those who died in the case of Trollet were bitten in the hand or face. Dr. Parry relates an interesting circumstance applicable to the present point. Dr. Ingenhousz was experimenting on the deadly power of the Ticunas poison. He had just envenomed the point of a knife, when it fell from his hand, and, piercing the shoe and stocking, wounded his foot. He threw himself back in his chair, and calmly said, "In five

minutes I shall be a dead man." The five minutes, however, having elapsed without any symptoms of approaching dissolution, he ventured to remove the knife, and wash the wound. The poison, like the vitiated saliva, was in a fluid form, and it had been entirely wiped from the point of the knife in its passage through the shoe and stocking.

Insatiable thirst accompanies the later stages of rabies. The virus may have been largely diluted with water, and rendered comparatively innocuous.

There is, however, something more than this in the affair. The skin of the dog is loose, like that of cattle. It is sometimes covered with thick hair; and, except in the petted and delicate varieties, it is not very easily penetrated; yet two-thirds of the dogs inoculated with the rabid poison are lost. There is a predisposition to be affected which does not exist in other animals. There is an affinity between the virus and the tissue with which it comes in contact, or a facility for the developement and growth of the virus.

An animal or a human being is bitten by a rabid dog; and a certain portion of the poison is received into the wound. It produces no immediate irritation; there is nothing to indicate its presence. Some old writers, indeed, recommend us to place the fresh leaves of rue on the wound. If they retain their colour, it is not envenomed. If they change to a violet colour, the rabid poison has been introduced. They likewise tell us to rub a bit of bread in the blood or fluid discharged from the wound. If there be no danger, a dog will readily eat of it; if it be contaminated with the virus, he will refuse it with howling.

These fooleries are now despised. There is nothing to indicate the presence of the virus. The wound heals, as would another wound, according to its situation, magnitude, laceration, and the constitution of the patient. Days, and weeks, and months pass, and not the slightest circumstance occurs to indicate impending danger.

What then is this virus? It has never been analysed. That would be a process difficult to accomplish. It is not

diffused through the air, nor communicated by the breath, nor by any effluvia, nor even by actual contact, if the skin be sound. It must be received into a wound; or it must come in contact with some tissue or nervous fibril; and there it lies dormant for a considerable but uncertain period, and longer in some animals than in others.

It remains perfectly undecomposed. The absorbents are actively at work in removing every thing around. The capillary vessels are depositing fresh matter, but it seems to remain the same. Whatever else is useless, or would be injurious, is taken up, and the tissue or the fibril on which the virus rests, is modified or changed; but this extraneous and fatal body bids defiance to all the powers of nature.

It enters not into the circulation, or it would necessarily undergo some modification in its passage through the innumerable minute vessels and glandular bodies which are scattered through the frame. It would excite some morbid action; or if it were not thus employed, or in the purposes of renovation or nutrition, it would be speedily ejected.

It lies for an uncertain period dormant; but at length, from its constant presence as a foreign body, it may have rendered the tissue or nervous fibril more irritable and susceptible of impression; or it may have attracted and assimilated to itself elements from the fluids that circulated around it, and thus increased in bulk; and at length, according to a law of chemistry, supplied by quantity that which it wanted in strength of affinity.

Whatever be the *modus operandi*, the parts in contact with the virus at length respond to the stimulus applied to them. The cicatrix generally begins to itch, and inflammation spreads around it. The diligent licking of some part where the mark of a bite can be traced, is an early and frequent symptom of rabies in the dog. The absorbents are now called into more powerful action. They begin to attack even the virus. A portion of the morbid matter is taken up and carried into the circulation, and disease and death ensue.

At what period of time does this fatal activity commence? It is different in different individuals and different animals. While the rabid virus lurks in the frame, any thing that produces considerable excitation in the system, or that renders the nervous fibres, or the textures generally, suddenly and highly irritable, may rouse it to action. These causes may even rouse to activity that which would otherwise have never possessed sufficient power to affect the constitution. There are several instances of this in the annals of human medicine. If the pregnant bitch becomes rabid, it is within two or three days of parturition. The bitch not in pup is often attacked during the period of œstrum.

Most strange and contradictory accounts are given of the time between the bite and the appearance of hydrophobia in the human being. Some have asserted that it has appeared on the same day, or within two or three days. We should be at no loss under what class of nervous diseases to rank affections like these.

Dr. Bardesley relates a case in which twelve years elapsed between the bite and the disease. If it may lurk so long as this in the constitution, it is a most lamentable and dreadful affair. If the sword may be so long suspended over the patient, his situation is most pitiable.

With the exception, however, of another case, and that of apocryphal character, and in which nineteen years are said to have intervened, Dr. Bardesley's account stands alone; and it is adduced by him to establish a particular hypothesis.

M. Bresa mentions a case, but clearly not one of rabies, in which five years and a half elapsed between the bite and the disease. There is an authenticated case related by Mr. Nourse, in which nineteen months passed, a sufficient length of time for the patient and his friends to endure the torture of suspense.

The usual time, I believe, is calculated at about six weeks, or extending from three weeks (Dr. Mason Good says ten or twelve days) to six or seven months.

In the dog I have never seen a case in which the disease occurred in less than seventeen days after the bite. The average time I should calculate at five or six weeks. At three months I should consider the animal tolerably safe; but I have met with two instances, in one of which it occurred so late as the fifth, and in the other after the expiration of the seventh month, and where re-inoculation was not suspected, and was scarcely possible.

There are strange kennel stories of the virus lurking in the constitution of the dog for twelve or eighteen months. I have never met with an instance of this, and I attach to it as much faith as I do the histories of the very walls of some kennels imbibing the poisonous effluvia of rabies, and to so great a degree that no white-washing could disinfect the building. The quarrelsomeness of hounds, and especially at feeding time, is well known. The dangers to which they are exposed when going to cover, or returning straggling late in the evening, cannot be denied. One village cur may commence the mischief, and it will soon spread through the pack.

The average time of the appearance of rabies in the horse is from one to two months after the bite. I know but one case in which it exceeded four months.

I have seen but one rabid ox; the disease appeared on the twenty-second day after the inoculation. A veterinary surgeon tells me, that, in a case which he attended, the intervening time was five weeks.

In the sheep the shortest period I know was twenty days; the longest, seventy.

Of the swine I cannot speak.

The duration of the disease is different in different animals. In man it has run its course in twenty-four hours, and has rarely exceeded seventy-two. A case is related in the *Lancet* of July 12th, in which, by repeated bleedings, it was protracted to the fourteenth day.

In the horse it varies from three to four days; in the dog from four to six; and in the sheep and ox from five to seven days.

SIXTH PAPER, VETERINARIAN, Vol. i, p. 321.

A Case of Rabies—Injection of Warm Water—Bronchotomy.

BEFORE I proceed to the preventive or curative treatment of rabies, it may not be uninteresting or useless to narrate a few cases. The reader will be enabled to form a better estimate of the value of the opinions that have been stated, and will be better prepared to determine what can or ought to be done.

A white terrier, of which no previous account could be obtained, except that it was quite well two days before, was brought to me at 3 P. M. Nov. 26, 1827. The lower jaw was partially paralysed; the tongue hanging out, and of a dark colour; evident strabismus, and the cornea of the left eye becoming opaque and *green*; a slight staggering in the gait, and the eye occasionally fixed on or following some imaginary object. In two hours a grating choaking sound began to accompany each inspiration, and the dog worked with his paws at the sides of his mouth, as if to get rid of something that excessively annoyed him. His efforts to accomplish this were exceedingly violent, and he rolled over and over in the attempt. He began to be very uneasy, and was shifting his posture and scraping his bed together almost every instant. No howling, nor the least disposition to bite.

Mr. Mayo had expressed a wish to experiment on a rabid dog. He favoured me with a call about 9 o'clock. Seven ounces of blood were detracted from the jugular; and an attempt was made to inject an equal quantity of warm water. The experiment did not perfectly succeed. Five or six ounces more of blood were lost, and eight or ten ounces of water injected. During the process of injection the animal heaved convulsively, and vomited twice.

Nothing more was done for a quarter of an hour. The laborious breathing and choaking inspiration evidently increasing, the anterior portion of the second ring of the trachea was excised. This afforded not the slightest relief,

but, on the contrary, the hoarse, grating, choaking inspiration was decidedly aggravated.

The poor fellow was again liberated. He was very weak, continually shifted his posture, but was afraid to lie down. At 12 o'clock I saw him again. He was sitting leaning against the wall, and scarcely looked up, but the heaving at the flanks and the hoarse grating sound were the same.

Nov. 27th, 6 A.M. He was found dead: he had slipped a little from his leaning posture, and must have died without a struggle.

At 12 the post-mortem examination took place. Slight vascularity of the pia mater—none of the cerebrum or cerebellum. No fluid in the ventricles, or vascularity of the plexus choroides. The medulla oblongata, on being cut into, shewed slight pinkiness of substance. Some fluid between the dura mater and the spinal cord, and considerable injection of the sheath of the spinal marrow through its whole extent. The tongue was discoloured at its extremity—no vesicle or swelling on the frænum. No inflammation of the pharynx, the larynx, the trachea, the bronchial passages, or the substance of the lungs. The bronchiæ, however, were filled with bloody spume; and there was slight injection of the epiglottis, with turgescence of the small vessels in the angle behind. The muscular substance of the heart was dark coloured, but no ecchymosis. No inflammation of the œsophagus. Much bile had been thrown into the stomach, and had stained the whole of that viscus. Most of the rugæ were inflamed, but not violently: no ecchymosis. Not the smallest portion of indigesta in the stomach. Much bile in the duodenum, and slight peritoneal inflammation through the whole of the intestines.

This was a singular case, in some respects deceptive, yet clearly marked. The disease was evidently cut short by the two important experiments, the result of which will furnish matter for observation hereafter.

SEVENTH PAPER, VETERINARIAN, Vol. ii, p. 86.

Disease principally propagated by the Fighting-dog in Towns and the Cur and Lurcher in the Country—Preventive Measures—Ligature—Cupping—Excision—Caustic—Comparison between them—no Stimulating Application to be applied after the Operation—Period at which the Operation may be successfully performed.

It has been proved that rabies is propagated by inoculation alone; and although every animal labouring under this disease is capable of communicating it, the bite of the rabid dog is, with very few exceptions, the cause. The malady generally appears in the dog between the third and seventh week from the period of inoculation. At the expiration of the third month, the animal is comparatively safe. At the close of the seventh month there is no danger. Then if a species of quarantine could be established, and every dog were confined separately for seven months, the disease would be annihilated.

Dreadful, however, as are the ravages of this disease, and progressively and rapidly as its victims increase, it might be difficult to induce the sporting world to submit to this restriction. Such a quarantine could not be enforced. Then we must resort to other measures to lessen, if not to terminate, the devastations of this malady. Whence arises the evident increase of rabies? From the increasing demoralization of the country. From the lately adopted and cruel system of parochial government the peasantry of England is become degraded. The cottager is no longer enabled to support his family by honest labour; and the auxiliary pittance which the parish affords is doled out with so niggardly a hand, and accompanied by such circumstances of debasement, that he revolts at the acceptance of it. He tries other and fearful resources: he becomes a poacher—he is one of an organized gang of nightly depredators. To qualify himself for this, he provides himself with his dog, ostensibly to defend his little all, but actually for the most nefarious purposes. Let the

local authorities, who have lorded it somewhat too highly above their fellow-men, here promptly and *justly* interfere. Let all relief, in every shape, be denied where a dog is kept.

In large towns, within these few years, the dog pits, those nurseries of crime, have been established. The mechanic, the groom, the coachman, the apprentice, mingle there with the ruffian and the avowed thief. I will not speak of the barbarous deeds which are there perpetrated; but I will refer to the thousand instances, which the peculiarity of my practice has brought under my notice, of the inevitable destruction of humanity, honour, and honesty, in all who are deluded to frequent these sinks of iniquity; and without the slightest hesitation I will affirm, that rabies is propagated nineteen times out of twenty by the cur and the lurcher in the country, and the fighting-dog in town.

Then let a tax be laid on every useless dog; and doubly or trebly heavier than on the sporting dog. Let no dog but the shepherd's be exempted from the tax, unless, perhaps, the truck dog; and his owner should be subject to double penalty if the animal be found loose, or used for fighting.

If a person be unfortunately bitten by a rabid dog, what preventive means are to be adopted? Some have recommended a ligature above the bitten part. My opinion of this may be imagined from the statement I have hazarded, that the virus lies in the wound inert until it has assimilated to itself other matter and increased in quantity, or by its continued presence irritated the neighbouring parts, and disposed them to become affected.

The cupping-glass has been strongly recommended by Dr. Barry. I have some little objection to it. I am not sure that the virus, forced from the texture with which it lies in contact, by the rush of blood from the substance beneath, may not inoculate or become entangled with other parts of the wound. After excision of the part it

may be useful: connected with the caustic it can be of no avail.

Excision of the part is the mode of prevention generally adopted by the human surgeon; and it would seem to be most judicious practice. If the virus is not received into the circulation, but lies dormant in the wound for a considerable period, the disease cannot supervene if the inoculated part be destroyed.

Excision of the part has however frequently failed. Not a year passes without many lamentable instances of it. It has occurred in the practice of the most eminent surgeon; and it seems scarcely, or not at all, to impeach the skill of the operator.

How do we account for this? The knife may penetrate the deep and tortuous recess of the wound, in which the virus is lodged, and then its track will be empoisoned. Or if the incision be freely made round the wound, and does not penetrate into it, the blood will follow the knife; a portion of it will enter into the wound inflicted by the dog; it will come in contact with the virus; it will be contaminated; it will overflow that cavity; it will be received into the new incision, and it will carry with it the seeds of disease and death.

Aware of this, many practitioners use the caustic after the knife. Every portion of the new wound is submitted to its influence. Has the question never occurred to them, if the caustic be necessary to give security to the operation by excision, might not the knife have been spared, and the caustic alone used?

It will be imagined, then, that I am an advocate for the use of the caustic. Most certainly. But what caustic? Not a liquid one. Not one that speedily deliquesces. For, in the first place, it is unmanageable; and, what is a more important consideration, it may hold in solution, and not decompose the poison, and thus inoculate the whole of the wound.

The caustic which I would with much confidence re-

commend is the nitrate of silver. It is perfectly manageable. Being sharpened to a point, it may be applied with certainty to every recess and sinuosity of the wound.

The potash, and the nitric acid, will destroy the substances with which they come in contact; but the combination of the caustic and the animal fibre will be a soft or semi-fluid mass. In this the virus is suspended, and with this it lies, or may be precipitated upon, the living fibre beneath. Then there is danger of re-inoculation; and it would seem that this fatal process is often accomplished.

The eschar formed by the lunar caustic is hard, dry, and insoluble. If the whole of the wound has been exposed to its action an insoluble compound of animal fibre and the metallic salt is produced, in which the virus is wrapped up, and from which it cannot be separated. In a short time the dead matter sloughs off, and the virus is thrown off with it.

Previous to applying the caustic it will sometimes be necessary to enlarge the wound, that every part may be fairly got at; and I would without hesitation amputate, if I were not fully assured that I could get at every part. The eschar having sloughed off, it will always be prudent to apply the caustic a second time, but rather more slightly, in order to destroy any part that may not have received the full influence of the first operation, or that by possibility might have been inoculated during the operation.

Does any chemical combination take place? Is the virus neutralised by its union with the caustic? I cannot demonstrate this; but I have much reason to believe that some effect of this kind is produced.

It is painful to speak of one's-self; but I may, perhaps, here be permitted to say, that I have been bitten four times by dogs decidedly rabid. At each time I freely applied the caustic to the wound; and I am living to the present day. I have operated on more than four hundred persons, all bitten by dogs, respecting the nature of whose

disease there could be no question*. I have not lost a patient. One poor fellow died of fright, but not one became hydrophobous. To what can I so naturally attribute this, as to some chemical affinity between the nitrate and the virus, by which an insoluble and inert compound is formed?

After the operation, nothing stimulating should be applied. It is no unusual practice to keep open the wound for several weeks. This carries absurdity on the very face of it. We have stated that the virus long lies inert. It cannot exert its fatal energy unless it has added to its quantity, or the constitution or the part has become irritated, and more susceptible of impression. Then, if a minute portion of the virus should, perchance, remain in the wound, by applying stimulating unguents to the part, we take the readiest means to stimulate the absorbents to action, and we possibly produce that disease which would not otherwise have had existence. Destroy the part at once by the knife or the caustic, and then adopt the mildest means speedily to heal the wound.

Until what time may the knife or caustic be applied with a fair prospect of success? The sooner the better. I have said that it is probable the virus remains for a while innocuous in the bitten part. It may, however, be absorbed. Every analogy and fact would lead us to conclude that the absorbents have, for a considerable period, no power over it; but we have no strict and certain proof of this; therefore no delay should be admitted. I should, however, apply the caustic with confidence at any period before the appearance of the disease. Seventeen of my patients had been bitten more than a week before the operation; two more than a fortnight, and the majority more

* I am bound to add, that one of the surgeons of St. George's Hospital told me, that since his connexion with that establishment, he and his colleagues had operated on more than as many thousands, bitten by dogs (he could not say that all of them were rabid), and he was not aware that one of them had been lost. This, at least, is most consolatory, whatever may become of my theory of the caustic.

than twenty-four hours. Until some effect has been produced on the nervous fibrils in contact with the virus, and that, or the influence of it, has been conveyed to the common sensorium, and thence propagated over the frame, and thus new relations have been established with other and distant parts, I should not hesitate to operate. At one of our hospitals, amputation was not long ago performed above the bitten part, yet the poor fellow died. The disease had been established before the operation; and that series of morbid action had commenced which could not be arrested. There are facts, however, on record, which will fully exculpate the surgeon who advised or performed the operation. It is related in the *Medico-Chirurgical Annals of Altenburg* (Sept. 1821), that two men were bitten by a rabid dog. One became hydrophobous and died; the other had evident symptoms of hydrophobia a few days afterwards. A surgeon excised the bitten part, and the disease disappeared. After a period of six days the symptoms returned: the wound was examined. Considerable fungus was sprouting from its bottom: this was extirpated; the hydrophobic symptoms were again removed; and the man did well.

Trolliet relates a similar case. Several persons were bitten by a rabid wolf, and some of them died. The cicatrix in the arm of one man became inflamed, and gave him much pain. The caustic was freely applied, and no hydrophobic symptoms appeared.

It is only, however, in the early stage of the disease, that we should be justified in destroying the part and torturing the patient; and if we proceeded to operation, that operation should be complete and severe, not only to eradicate all the virus, but by a new and violent irritation, to cause possibly a salutary metastasis.

These, then, are the grand preventives; viz., the knife and the caustic. Every surgeon must decide for himself respecting their comparative value. I only ask, that they who may prefer the caustic, may no longer be exposed to so much gratuitous abuse. It is, however,

some consolation, that this abuse has proceeded from those who had little experience.

Dr. Measey, upon personal knowledge of one unfortunate case only, in which first the snake-stone and then the nitrate of silver was applied, and afterwards the blister ointment, and the wound kept open for several weeks, indulges himself in a tirade against the caustic. He conveniently forgets the vesicatory, and the subsequent stimulants, by which irritability was given to the part, and the mischief probably effected, and says, "this proves the inefficacy of the application of caustics to the bitten part;" and he adds, "that he is quite satisfied of their perfect inutility, and surprised how persons can torture their patients with them."

Another gentleman of great talent states, that "the knife timely applied, was never known to fail." Have we not many accounts every year of the failure of the knife in the most skilful hands? Of the two persons who were bitten by a rabid dog in the neighbourhood of Ball's Pond, one of them went to a very eminent surgeon. The part was excised, but he died hydrophobous. The other was sent to the humble writer of this paper. His was by far the deeper and the more lacerated wound. The caustic was employed: it was thrice repeated; and the patient is living and well.

I am not presumptuous enough to condemn the use of the scalpel, although I much prefer the caustic, and would use the knife only fairly to get at the wound; but I must find fault with those who, to carry a particular point, strangely exaggerate and mistake. The truth is, that both the knife and the caustic have failed. The surgeon has not been able to get at and destroy every part, or in the use of the knife re-inoculation has been produced by the very operation.

EIGHTH ARTICLE, VETERINARIAN, Vol. ii, p. 126.

Preventive Medicines—the Use of them justified when the Wound is extensive—the Box—Alisma Plantago—Belladonna—Scutellaria—Combinations of Drugs—Experiments on the Scutellaria and Belladonna combined—Cautions as to the Administration of Preventives.

I CAN conceive that cases may occur in which the knife or the caustic may have been freely used, and yet the surgeon may not be assured that every portion of the wound has been destroyed, or that re-inoculation may not have been produced by the very operation. Amputation may be impracticable, or it would deprive the patient of all means of subsistence.

Are there other auxiliary preventives? Are there drugs which may neutralise the virus, or render the constitution insensible to its power?

I am fully aware that the imputation of quackery is generally associated with the recommendation of these preventives, and that the regular surgeon is with difficulty brought to adopt them; but, the truth of the matter is, that the knife and the caustic *have failed* in the most skilful hands. Few weeks pass without some lamentable account of the ravages of hydrophobia, although the poor patient had submitted to the usual and the best surgical treatment. Lacerated wounds may present themselves, which cannot with absolute certainty be bottomed; or many an hour or many a day may have elapsed between the infliction of the bite and the application of the caustic.

The humane and honest surgeon will painfully reflect on the possible melancholy issue of the affair. He will identify himself with the feelings and apprehensions of the family and friends of his patient. He will place much confidence on the attempted destruction of the part; but he will look anxiously for some subsidiary measure which shall make assurance doubly sure.

When the nature of a disease is understood, and the time of its appearance nearly calculated, is it unphilosophical or unsurgical to attempt so to modify or change the connexion and action of certain parts, or to bring the constitution generally into such a state, that the influence of the virus or disease may possibly be resisted?

We know that under the powerful agency of one stimulus, the constitution is apparently dead to every other. If the poison of measles has been received, and a person be subsequently inoculated with variolous matter, the small-pox will not appear: the virus will remain inert, until the measles have run their course.

Can we, then, excite a certain action, and maintain it until the rabid virus be neutralised or expelled? That fatal poison lurks a certain time in the wound; and if it be not then roused to action, it either becomes innocuous, or it is taken up by the absorbents and expelled.

Rabies is an affection of the nervous system. Is it impossible, by the exhibition of some diffusible stimulant, whose power of excitement may be considerable and permanent, and its sedative effect slight and transient, and whose principal action is on the brain, to maintain a constant excitement of the nervous system until the virus is worn out? or may a gradual change or modification of the cerebral and nervous substance be produced, so that it shall not be susceptible to the influence of the virus?

With this view the mineral tonics, zinc, copper, mercury, and arsenic have been recommended. I should have more faith in *narcotics*, if one could be found which would produce a constant, but not dangerous state of nervous excitement, and incompatible with the excitement of the virus.

The Box has been recommended. I have reason to believe that it is the basis of the preventive drinks so celebrated in some parts of Hertfordshire and Kent. They consist of a strong decoction of the common box with some rue, and coloured and disguised at the caprice of the preparer.

My late and respected partner, Mr. Blaine, had considerable faith in it. We instituted numerous experiments on its supposed preventive power. It was evidently a narcotic. The human patient complained of much giddiness for half an hour after taking it, and the dose for the dog was regulated by the production of staggering and distress. Several were destroyed by an over-dose. The medicine was recommended to be given on three successive days. It had undeniable efficacy in preventing the disease. The majority of the dogs to whom it was exhibited were saved.

We tried it in the form of powder, extract, infusion, decoction, and tincture. We were most successful with the extract; but instances of failure occurring by far too frequently, it was by degrees abandoned. In two cases it was given in smaller doses, just sufficient to produce a slight effect on the dog, and continued daily during five weeks; and in both it perfectly succeeded.

I recollect that there was much apparent caprice attending the exhibition of the box. Sometimes for two or three months we did not lose a dog; and then we had six or eight successive instances of failure. The medicine was prepared as usual, and in each case the dogs had been bitten by others decidedly rabid.

The next celebrated preventive to which I resorted was the *Alisma Plantago*, first introduced by a Russian nobleman named Lewshiem: its boasted efficacy was strictly inquired into by the magistracy of Toola, and the recipe purchased by the Russian government at an immense price. I began with the English *Alisma Plantago*. It griped, purged, and produced some giddiness; but it prevented not the appearance of the disease, nor arrested its progress. I then procured the supposed Russian *Alisma* from our herbalists. In one instance only did the symptoms of the disease appear to be mitigated; and it in no case succeeded as a preventive.

Through the kindness of the late Sir Joseph Banks I procured a little of the true *Alisma*, but not in sufficient

quantity to try its preventive power. I soon, however, had opportunity to put its curative efficacy to the test. A coach-dog belonging to the Sardinian ambassador was rabid, and frightfully ferocious. With some difficulty, and a little danger, I contrived to give him two drachms of the powdered root, suspended in a little mucilage. He was evidently quieter. Six hours afterwards the same quantity was administered. His desire to do mischief altogether ceased; the harmless or paralytic stage of the malady supervened, and he died in twenty hours after the second dose.

About the same time I administered the *Alisma* to another dog, rabid and ferocious. His ferocity was subdued, and the disease seemed to be protracted; but he died. I have since, on three occasions, tried the *Alisma* of our herbalists, but not with any satisfactory result.

I then tried the *Belladonna*, which Dr. Luighi Brera, of Modena, had given with so much success. As a cure, it utterly failed, although in doses of two scruples. As a preventive, it had evident power. Beginning with two grains, and increasing the dose to a scruple twice every day, and continuing this for six weeks, I am confident that I saved several dogs; but I lost almost as many. They all became debilitated, and most rapidly emaciated. One seemed to die of pure marasmus. Those which died rabid had every symptom materially mitigated, and showed no ferocity.

In the year 1820, my attention was first directed to the *Scutellaria Lateriflora* (the skullcap), Class *Didynamia*, Order *Gymnospermia*, and which Dr. Spalding had found so extraordinarily successful as a preventive of rabies. It grows in most moist shady places in North America; it is a labiated plant, flowering from July to September, bearing small blue flowers, but otherwise having considerable resemblance to our common mint. Dr. Spalding infused a tea spoonful and a half of the powdered leaf in a quart of hot water, and gave half a pint morning and night, omitting the dose every third day, when a mild

purge of sulphur was given. He says, that he has administered it, with invariable success, in no less than eight hundred cases; and in several of these cases the disease had actually commenced its career.

I procured some from our herbalists; and although I uniformly failed in arresting the progress of the disease, I soon began to be satisfied that it had considerable preventive power. These experiments were then suspended, until I could import a quantity on the genuineness of which I might place full dependence. I began with an infusion of the strength recommended by Dr. Spalding, but soon found it convenient to give a smaller and more powerful dose. It produced in myself, when four ounces were infused in a quart of water, and a wine-glass full taken, a feeling resembling the pleasing exhilaration of incipient intoxication, rapidly changing to a giddiness not so pleasant, but the whole passing off in eight or ten minutes, and leaving no exhaustion or depression.

As a cure of rabies once established, it never succeeded. As a preventive, I was brought to regard it as a most valuable medicine. In three cases, at least, out of four, rabies appeared not; but in about one case out of four I did not succeed. I then, for the sake of convenience and precision, used the powder beat into a mass, in the proportion of two parts of the scutellaria to one of palm oil. I fancied that I was rather more successful; but awkward instances of failure would occur.

I then began to combine it, and, at first, with all the other herbs in which I thought I had discovered some power—the box, alisma, and belladonna. I did not succeed so well. I discarded first the alisma, and then the box, retaining the belladonna in the proportion of half an ounce to a pound of the scutellaria, and the result has been a medicine which I cannot, dare not, call a specific, for it has failed, but the use of which, in the cases of doubt and fear to which I have alluded, I would most earnestly recommend.

For the purposes of my lectures, and assisted by my

house-pupils, I have, within the last twelvemonth, made two experiments, the results of which were very satisfactory. Three pieces of tape were thoroughly moistened with the saliva of a rabid dog, and inserted as rowels in the polls of three dogs. To two the scutellaria and belladonna were given; the third, a fox-hound bitch, was abandoned to her fate. On the twenty-ninth day after the inoculation she became rabid; the others are living and well.

I afterwards took the same two dogs, and a third. I moistened two pieces of tape with the saliva of a rabid dog, and inserted them in the polls of one of the old ones and the third dog. Another piece of tape dragged repeatedly through the mouth of the same rabid dog twenty-four hours after its death, was inserted in the poll of the second of the old dogs. This dog and the new one were suffered to take their chance. To the other old dog the medicine was given. In the fourth week, the new dog died, undeniably rabid; the other two yet live.

I am perfectly aware of the fate of many medicines in which their advocates placed unbounded confidence, and therefore I will only say, that my faith in these herbs is at present strong; and I would urge my brother veterinarians, and, if I dared, the practitioners of human medicine, to institute similar experiments, and to put the efficacy of the scutellaria and belladonna to the test.

I begin with a drachm ball to a moderate sized dog, containing two scruples of the scutellaria, and about two and a half grains of the belladonna: this is given morning and night. On the second week, two balls are given; on the third, three; and this continued for six weeks. The animals seldom cease to eat, but they very rapidly lose flesh. In two cases the medicine seemed to be pushed a little too far. The dog refused his food, could not be coaxed from his cub, and much saliva flowed from his mouth. The medicine was omitted for four or five days, and then again given without any unpleasant result.

I would, however, remind the experimenter, that, even

in the pursuit of so important an object, he must not too much hazard his own safety, or endanger that of others. I have sometimes thought of having a mailed glove (a glove with steel scales) made for me : a glove of chamois leather within, oil-skin between, and doe-skin without, will, however, effectually prevent the penetration of moisture or the animal's tooth.

I have very rarely recommended this preventive to the human being. When the wound has been superficial or slight, and the caustic has certainly reached every part of it, I should not have been justified in disturbing the mind, or exciting the fears of the patient or his friends. The very act of being drenched day and night, for six weeks, with a nauseous medicine, would produce and perpetuate a state of nervous irritability, that might too probably predispose the constitution to be affected by the poison. More, perhaps, than the surgeon thinks, depends on the mind. It should be his object, and is his imperative duty, to inspire his patient with perfect confidence in the efficacy of the surgical means that have been adopted. That which is to be done, should be "done quickly," and "done, when it is done."

The surgeon will likewise apprehend, that if it be commonly believed that there is much or any efficacy in preventive medicines, the patient may be rendered averse, perhaps unconquerably so, to the necessarily painful process which the experience of every age has proved to be the best security, and many a useful life may be sacrificed.

Until, therefore, we have greater experience of the power of these preventives, and have arrived at absolute certainty on the point, we are not justified in using them, except in extraordinary cases, and least of all to the neglect of the knife or caustic.

These extraordinary cases will sometimes occur. The situation or extent of the wound may throw some doubt on the perfect efficacy of the operation : then I would strenuously recommend the *scutellaria* and *belladonna*. Do not keep open the wound by stimulant and painful un-

guents, or you may produce that irritability of the part which will dispose it for the action of the virus. Operate as carefully and as effectually as you can. Then adopt the most soothing measures, and heal the wound as rapidly as may be, and try the effect, and the long-continued effect, of these stimulants on that texture which would be the seat of the disease.

In the quadruped, if he be of sufficient value to warrant a recourse to long-continued and expensive medical treatment, the use of this preventive may not only be permitted, but is always indicated. Covered with hair, as are the skins of our patients, we can never be assured that we have discovered every wound. I have more than once most carefully examined a dog supposed to have been bitten, and could not detect the slightest puncture or scratch; yet it has died rabid. Every wound that can be discovered, should be freely operated on, and the preventive given, as *here* a necessary auxiliary, but with the strict regard to personal safety, and the safety of others, which I have already urged.

I have a considerable quantity of the scutellaria, for the genuineness of which, I think, I can vouch, and which is perfectly at the service of any human or veterinary surgeon who is disposed to experiment on it, and will do me the honour to send for it.

NINTH PAPER, VETERINARIAN, Vol. iii, p. 6.

Curative Means—Inefficacy of them—Alisma Plantago—Belladonna—Scutellaria—Box and Rue—Bleeding—Injection of Warm Water—Bronchotomy—Cauterization in the Poll—Mercury—Opium—Ammonia—Cantharides—Guaco—Veratrum Sevadilla—the Ticunas.

THE concluding portion of my essay on Rabies Canina, comprising the *medical treatment* of this dreadful disease, has been too long delayed. The truth is, that I had nothing satisfactory to offer; but hoped that zealously continued experiment, or some fortunate accident, might en-

able me to communicate that which would have been most gratifying to myself, and a valuable addition to our stock of pathological knowledge. Not one instance, however, of successful treatment of rabies has occurred; and I am anxious to get rid of an unpleasant subject.

Other practitioners are said to have been more skilful, or more fortunate; and, indeed, I was told by one of them, *almost* at the head of our profession, that he had cured several cases of rabies. I would call upon that gentleman respectfully, but firmly, to favour the medical world with the history of these cases. He will not discharge the duty which he owes the profession or the public if he declines the challenge.

In *THE VETERINARIAN* for April last I related some experiments on the *alisma plantago*, the *belladonna*, and the *scutellaria*, as preventives. The first was given, after the disease had appeared, in various doses; sometimes without the slightest effect, but generally with an evident although temporary mitigation of the symptoms. The following is the most marked case:—

Feb. 13, 1819.—Mrs. Hodges's (5, Hertford Street) spaniel has for two days refused its food. It has become exceedingly irritable, and had worried a cat of which it was previously very fond. It lapped its own urine, and frequently uttered the characteristic howl. It was becoming weak about the loins, and began to stagger. As he was brought along the street to me, he suddenly sprung on a dog and bit him. His eyes were red, and somewhat protruded; and his look was wild. His lower jaw hung down *a little*, and his tongue was slightly protruded and leaden-coloured. He was restless, and shifted his posture every moment. His breathing was laborious, and slight spasms were observed about his cheek and mouth.

He was brought to me early in the morning, and at 9 A. M. ʒii of the *alisma plantago*, powdered, were given to him, suspended in mucilage. For an hour he continued restless and howling as before; but at 12 the howl had changed to a fainter sound, resembling a whine, and the dog was sitting on his haunches, quiet and depressed.

At 2 P. M. the dose was repeated. He struggled against it, and, from partial suffocation or exhaustion, fell on his side, stretched himself out, and appeared as if he were dying. He soon recovered; and half an hour afterwards I found him quietly seated as before; his breathing was less laborious,—the whining had ceased,—the dog was perfectly sensible,—the wildness of countenance was gone, and an expression of extreme exhaustion remained,—he wagged his tail when spoken to, and arose and came slowly towards me,—he refused to eat, but lapped, and seemed to swallow a little water; and I saw him void his urine, and turn from it without lapping it.

7 P. M.—He was sitting quietly; the jaw no longer dependent, but his head almost as low as his elbow. He recognized me, and faintly wagged his tail. A drachm of the alisma was given; he again struggled and fell, and seemed to be dying; but in ten minutes he resumed his sitting posture. I saw him in this situation at 10 o'clock, but at six on the following morning he was dead.

The Belladonna was then tried on other rabid dogs, with more decided effect, and especially when the powdered leaf was used in the form of ball, or suspended in mucilage. The symptoms remitted, and exhaustion and even paralysis succeeded; but the animal died.

To this followed the redoubted *Scutellaria*, affirmed by Dr. Spalding never to have failed—certainly never given without evident effect, and of a more pleasant character than that which was produced by the alisma or belladonna. The extreme irritability was lessened or ceased, without the depression of the one or the exhaustion of the other. These experiments have been followed up, but I confess not with *all* the diligence that ought to have been used. All these drugs have power; relief to a considerable extent may be afforded by them; and, possibly, a clue may be obtained, which may eventually lead to a most important desideratum.

Jan. 19, 1813.—A terrier belonging to Mr. Garrard, of Panton Street, died rabid, having previously bitten his young master, and a poodle belonging to Mr. G. He was

immediately drenched with the Hertfordshire preventive (a decoction of box and rue in milk), and the dose was repeated on three successive mornings.

Feb. 4.—Is very quarrelsome; challenges every dog he meets, and his countenance expresses much wildness and ferocity. He was sent to my infirmary, and was bled and freely purged with aloes and calomel.

10th.—He has regained his usual habits.

19th.—He was this morning brought to me again. He had on the preceding day quarrelled with some imaginary object, and had barked furiously at it for an hour. He was now dull, and scarcely noticed the departure of his master, to whom he was much attached. Respiration laborious; jaw slightly dependent, yet able to eat; eager for water, quiet, and offered his paw as usual. R. Pulv. antimonial. gr. iij; calomel. gr. xij.

20th.—Jaw more dependent, and unable to eat; eagerly lapped water, but able to swallow a very little; a wild, anxious look; the eyes frequently closing, and the head drooping; spasmodic motion of the head; watching the nails on the partition, and snapping at them. A stick violently enraged him. He made frequent attempts to get at a mare which stood in the next stall. Gave half a grain of arsenic every two hours.

21st.—Spasms more frequent; thirst extreme; breathing laborious. Flew savagely at me, but immediately crouched at my feet. Unable to bark, but made a peculiar deep, harsh, hollow noise. Continue the arsenic.

22d.—At 5 A. M. he died. The glottis was inflamed, and the membrane lining the trachea presented the most beautiful ramifications of the distended vessels. The pleura of the right lung highly inflamed. The stomach contained a considerable quantity of thick, greenish-brown fluid, and the cardiac portion of the villous coat was generally inflamed, without spots of extravasation. The duodenum and jejunum inflamed, but the inflammation lost in the lower part of the ileum. Ten grains of arsenic were given.

About this time some experiments were made on the

effect of bleeding. The following was the most interesting :—

March 11th, 1813.—Mr. Haslep's spaniel, accompanying his master to an auction room, was observed, seemingly in play, to snap at the feet of the persons near him. In the evening he bit his master, and his master's friend. He was easily brought to my hospital—seemed perfectly docile, and eager to be caressed; but once suddenly, and without provocation, snapped at the man who brought him. To a common observer he would have appeared to be in perfect health, except that his eyes occasionally closed and his head drooped, and he would earnestly watch some imaginary object. He weighed about 10lb. He was bled until he fainted; but not more than five or six ounces of blood were procured. He scarcely moved during the remainder of the evening, but slightly wagged his tail when spoken to.

12th.—Somewhat dull; his eyes closing and his head drooping, but not so often; still occasionally watching some imaginary object, but turned from a stick presented to him, and at which he yesterday eagerly snapped; sensible to caresses; ate heartily. V. S. \bar{z} iiij.

13th.—Much improved in the morning. Ate and drank heartily, and was perfectly gentle and tractable; but towards evening, the closing of the eyes and drooping of the head, and watching of that which had no existence, were more marked than ever; together with a spasmodic affection of the head,—a peculiar husky, guttural sound,—hiding of his meat, and lapping of his urine.—Should not the bleeding have been pursued?

14th.—I arose with the dawn, and found every symptom increased. I opened the carotid artery, and drew five ounces of blood. The dog fainted. He could not be induced to move during the whole of the day, and refused to eat or to drink; indeed, he took no notice of surrounding objects, except that after being repeatedly called he faintly wagged his tail. He barked two or three times almost in his natural tone towards evening, and died in the night.

Many years after the transfusion of blood was much spoken of, Mr. Mayo very kindly called on me and conducted an experiment on a rabid dog. It was a white terrier, brought from the country, and of which no previous history could be obtained, except that he had been "*queer*" for two or three days. The lower jaw was almost completely paralyzed; the tongue was hanging out; the dog was eager for water, but could not drink; there was slight strabismus, and on one eye was a green opacity.

In two hours after he was admitted, a grating, choaking sound accompanied his breathing, and he began to fight furiously with his paws at the corners of his mouth, as if he would get rid of something which insufferably annoyed him, and in the attempt to do this he frequently rolled over and over. He was continually shifting his posture, and was perfectly harmless. Seven ounces of blood were taken from the jugular, and an attempt made to inject an equal portion of warm water. The dog struggled violently, and full seven ounces more of blood were lost, and perhaps nearly as much warm water injected. During the process of injection the dog heaved convulsively, and was very sick.

A difficulty of breathing, painful to behold, ensued; and to relieve this, and as another interesting experiment, the anterior portion of the third ring of the trachea was removed.

On being liberated, the animal seemed very weak, but the difficulty of breathing was aggravated, and the choaking sound remained. He sat on his haunches, leaning against the wall, his fore paws continually slipping from under him. I watched him for two hours. He was gradually sinking, and he was found in the morning nearly slipped down, and his head resting on the ground, so that he must have died without a struggle.

Another dog afflicted with rabies was brought on the following day. Mr. Mayo again kindly attended; and, having observed evident injection of the medulla oblongata in the last case, he recommended severe cauterization as

close to the poll as possible. Three deep longitudinal furrows were burned with the common firing iron. The dog seemed to suffer much less than we could have supposed possible; and the disease pursued its course, neither aggravated nor mitigated by the experiment.

Of the effect of mercury in every form numerous trials were made, but in no case with decided benefit, notwithstanding Dr. James's unqualified assurance of its power to arrest the disease.

Opium, ammonia, cantharides, and various other drugs, were successively put to the test, and failed; and it is a lamentable conclusion, that, with the veterinary as well as the human practitioner, this disease remains the opprobrium of his art*.

* Since this paper was written, I have had the satisfaction of being present at some experiments made by Mr. CÆSAR HAWKINS on the *Guaco*.

The subject was a dog labouring under the dumb or harmless variety of rabies.

The muscles of the tongue and lower jaw of the dog were nearly paralysed, and the breathing was accompanied by a hoarse and grating sound. The true rabid howl was frequently uttered, and the dog was restless to a very great degree. One dose was given (about half an ounce of the expressed juice of the guaco) in the afternoon, and the second in the evening, with some slight relief of the symptoms; but, after the third dose, on the following morning, the change was most extraordinary. The dog recovered, to a very considerable degree, the use of the jaw, and could not only masticate the food when put into his mouth, but could with tolerable ease pick it from the floor: the howl ceased, and the restlessness disappeared. I had witnessed much mitigation of symptoms from the belladonna, alisma plantago, and scutellaria, but nothing to this extent. I was surprised and pleased, and almost began to fancy, that at length the grand specific was discovered. The medicine was continued during the day, but on the following morning the dog was found nearly paralysed all over, and died. The remission of the symptoms was very extraordinary, and the medicine deserves farther trial.

The guaco was afterwards given to a young man, evidently hydrophobous, in St. Thomas's Hospital. It failed to cure the disease, but the patient experienced relief, although slight and temporary, after every dose. Mr. HAWKINS gave to another dog labouring under the same kind of rabies the *veratrum sevadilla*; affirmed to be, in South America, a

Perhaps these experiments have not always been pursued in a sufficiently definite and scientific order, and I may not have availed myself of many opportunities to multiply them; but it will be recollected, that I never had a right to expose others to a danger from which I shrunk myself, and that I might certainly be permitted to calculate how far my own safety and life might be compromised. For the last eighteen months we have seen comparatively little of this disease, but it will break out again, and annoy and devastate*. I should, then, feel honoured if human or veterinary practitioners would kindly send to my dissecting room quadrupeds labouring under rabies, or destroyed by it, that we may experiment on, or examine them together. I would willingly take my full share, or, perhaps, the whole of the danger, because from habit I should best know how to guard against it; and if one or two of those who are so well able to guide the researches of the comparatively uninstructed veterinarian, and to whom we already owe so much, would favour me with

specific against the bites of poisonous reptiles and rabid animals. Although four times the quantity said to be sufficient to cure the disease was given, not the slightest effect was produced. On the same occasion, being willing to see what effect one poison would have in weakening or destroying the effect of another, I inoculated a rabid dog with the *ticunas* poison. Although not ferocious, the animal had been in a considerable state of excitation. An incision through the integument was made on the inside of the arm, and a pointed bit of wood that had been dipped in the poison was rubbed on the exposed fasciæ. No effect being produced, the same piece of wood, a quarter of an hour afterwards, was introduced into the incision which had been made by a person who was not aware of the nature of the disease, in order to bleed the animal. In less than two minutes the dog was more tranquil, and, at the expiration of five minutes, it dropped motionless, and the only indication of life was a regular and not laborious breathing. In this state he continued for eight hours, when I left him for the night. On the following morning I found him dead.

* When this was written, I little thought how soon, and to what sad extent, the prediction would be verified.

permission to send to them when any case of rabies occurs in my own practice, I should feel exceedingly grateful, and both veterinary and human practice might probably be benefitted.