

Montignault

On
The Prophylaxis
of
Hydrophobia

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On.

The Prophylaxis of Hydrophobia.

Of all the diseases to which the human frame is liable there perhaps is none, which - from the obscurity of its origin, the strange series of phenomena that mark its progress, the agonizing sufferings that accompany it, the unsatisfactory results of all treatments heretofore employed and its only too surely fatal termination, - is more worthy of our strongest interest and most careful investigation, than the fearful malady, Hydrophobia.

As the cure of the disease can hardly be said to be within the reach of surgical skill, the consideration of the best means for its prevention is obviously of the highest importance; and it is to this point that our efforts must be directed, in our attempts to limit or to eradicate the disease.

It has been denied by some that Hydrophobia can really exist, as a disease, in the human subject. They maintain that the cases cited as such, have been nothing more than examples of a nervous complaint, produced by the alarmed imagination of the patient, who having been bitten by an animal he fancied rabid, excited himself into Hydrophobia, and finally frightened himself out of existence! This was the opinion of the late Sir Isaac Pennington, Regius Professor of Physic at Cambridge, and

It is still held by some arbitrary authorities even at the present day. No doubt the terrible impressions produced in persons who have, been bitten by, been brought in contact with, or even seen, a rabid animal, may by the greatest fear and brooding anxiety they occasion, bring on, especially in hysterical subjects, a nervous condition, closely simulating the true disease; but readily to be distinguished from it, and differing from it widely in its course; rarely if ever proving fatal. Further, that such a state of the imagination may have an influence in accelerating the invasion of the true disease, and even increasing its severity when developed we do not deny. Now the fancy that all cases are thus to be accounted for is sufficiently disproved - on the one hand, by the fact that many persons after having been bitten by rabid animals have been so impressed by the terrible conviction that they were doomed to perish by the disease, that they have sunk into the most frightful and obstinate melancholia and despair, yet without any hydrophobic symptoms showing themselves. And on the other hand - by the extreme improbability that so many persons who have been bitten by rabid animals, should have suffered so precisely the same train of symptoms, and at last have died from the mere force of an excited imagination; and further by the fact that children and idiots have suffered from the disease, as well as adults.

in them, from consciousness of the application of the virus, or total ignorance of the existence of any such affection, the imagination could have had no power in calling forth the complaint.

Some again have affirmed that though hydrophobia is generally caused by the bite of a rabid animal, it is sometimes of spontaneous origin in the human species. Pinel gives the history of such a case: and Sauvage another, in the Journal des Savans for 1795: others too more recently have supported this opinion (Villermé, Mellanquet de Solis, the elder Guirac, Marthez &c.). We cannot absolutely deny the possibility of the truth of the theory, but, taking into consideration: 1st, the extreme rarity of cases where exposure to risk of inoculation cannot be more or less closely traced; and 2nd, the facility with which the virus may be introduced by the application of the saliva or buccal mucus to an abraded portion of skin or mucous membrane, - as by a mere passing kiss, or even without the presence of the animal at all as in the cases cited by Goussot, where a man perished from entering with his teeth a knot in a cord by which a mad dog had been confined; and a woman mending a sun in a dress, torn by a dog, pursuing the seam in her teeth, died by hydrophobia. - Taking these facts then into consideration, we cannot but

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but think, that in the cases cited as idiopathic hydrophobia
the poison has been introduced without the person being
aware of it, and that the spontaneous development
of the disease, is at the least, in the highest degree im-
probable. Admitting then that the disease in man
is the result of inoculation by an animal poison,
it becomes of importance to consider:

From what animals may he receive the infection?

And first there is no good ground to doubt its transmis-
sibility from man to man. True, some experimenters
have tried in vain to produce rabies in the dog by inoculation
with the saliva of a hydrophobic man, but we must
remember that all dogs, or persons either, inoculated
with the virus of an animal suffering under rabies even
of the most marked and undoubted character, do not
necessarily contract the disease. On the other hand, we
have the experiments of Mm. Magendie and Brucher,
who, on the 19th of June 1813, in the presence of a large
number of medical men and students, at the Hôpital de la
Charité inoculated two dogs with the saliva of a man named
Lurho, who had died of hydrophobia in the hospital that
same day. One of the dogs escaped & was lost sight of.
The other was mad on the 27th of the following month
and from him the disease was purposely propagated
through other dogs all through the summer. This fact,
with

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with the assertions that the disease has been directly
communicated by a hydrophobic man to his attendants,
in several cases, though perhaps not sufficient to set
the theoretical question quite at rest, is convincing
enough to make us very careful, in our ministrations
to patients labouring under the disease, not to let
the saliva or buccal mucus be applied to any scratch
or abraded surface, cutaneous or mucous, nor indeed
to come in contact with it at all, if it can be avoided,
but some solution of continuity should exist although
innocent and unknown. Then that the disease may be
produced by inoculation from the dog is too well
known to need any further proof. It may also be
communicated by the wolf; and the bite of this animal,
when rabid, has always been ^{to produce} remarked, the disease in a
very speedily developed and rapidly fatal form. Thus
in the cases given by M. Drollier & others: in December
1774, 20 persons were bitten near Troyes, 9 of them died;
in 1784, 17 persons were similarly bitten, and 10 died.
In May 1817, 23 persons were bitten, and 14 perished.
Of eleven bitten near Dijon, 4 died. Near Rochelle
18 were lost out of 24; and 12 persons died within
two months out of 19 bitten at Bar-sur-Omain.
Thus out of 116 persons bitten by rabid animals, 67 or
considerably more than one half perished. This is a much
greater

greater proportion of victims to the disease, than is observed after the bites of other rabid animals; and Dr. Lardier thinks it may be explained by the fact that most of them were bitten on the face, or about part the snout generally, springs, and which from its extreme vascularity furnishes the conditions most favorable to the rapid and complete absorption of the infecting virus. - Cases of fatal hydrophobia have followed the bite of the jackall, as in the instance given by Dr. Hewitt in the 13th vol. of the Medico-Chirurgical Transactions: - of the fox, as in the case of the late Duke of Richmond, who died in Canada from this disease, communicated it is believed, by one of these animals, of which he had made a pet: - of the raccoon, as in the case given by Dr. Russell of Massachusetts: of the cat, the badger, monkey &c. There has long been a doubt as to whether or no herbivora were capable of transmitting the disease. Certain experiments made by Prof. Dupuy at the Alford Veterinary School seem to support the belief: He rubbed into the wounds made in Cows & sheep sponges which had been chewed by rabid animals of the same species, but never succeeded in thus communicating the disease. But when he used a sponge saturated with the saliva of a mad dog, the disease was developed in the usual way. But on the other hand Hewitt

mentions

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Mentions a case in which a groom became affected with the
malady through a scratch, from the teeth of a rabid horse,
receiving whilst giving him a halter; and in a recent
report to the French Academy of Medicine, an authentic
case is given where a cow after having been bitten by
a mad dog, but in its turn (more probably scratched
in some such way as the above) a young shepherd
22 years of age, no prophylactic measures seem to
have been resorted to, owing perhaps to the belief that
cows could not communicate the disease; but rabies
broke ^{out} thirty days after, and carried off the patient
in eight and forty hours. Further, Braucher in his
experiments, repeatedly infected dogs with the saliva
of rabid horses and asses. So though rare & exceptional,
biting not being their natural mode of offence, trans-
mission through turbinaria is not impossible. Some
opinion that the disease has been propagated by the
turkey, hen & duck, and by rabbits, the truth of
which statement there can hardly be many opportunities
of testing. To sum up then, it would appear that the
disease may be of spontaneous origin in the dog, wolf,
fox, jackal, cat and badger, and from them may
be communicated to others, - from man at one extreme to
possibly the feathered tribe at the other, - and that these
in their turn, may by the inoculation of their saliva,
are

are capable of reproducing the disease. But, whilst admitting that the full disease may have as wide a range, we must remember that the malady in man has in the majority of cases its origin within much more narrow limits. The dog, having been in a very large proportion of cases the animal from which it has been communicated, thus M. Lardier in a speech before the French Academy of Medicine, quoting from the report of the Committee of permanent enquiry instituted in 1860 by M. Demours, states that out of 319 cases of confirmed hydrophobia 31 were produced by bats, 14 by cats, 1 by a fox, 1 by a cow, in 11 the origin was not mentioned, and in 261 the disease was communicated by the dog. Thus then as in the vast majority of cases (in this country the proportion would probably be even larger than the above) the disease is communicated to man, either directly or through the medium of some other animal, by the dog. Let us consider some questions concerning the disorder as it occurs in that animal: and first: What is its origin in the dog? It most frequently arises from inoculation from another animal; generally another dog, but also as is recorded cases from man, the hare, cow, ass, wolf & other animals. But is it never spontaneously developed? Gaviatt says no; that it is always communicated, and that if a well-enforced quarantine

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quarantine could be established, and every dog in the Kingdom confined separately for seven months, the disease might be extirpated. It is also adduced in favour of his denial, that it is unknown in some countries, as in the Iles of Cyprus, and in Egypt: South America too is a stranger to it, or was said to be a few years ago; and they affirm that it was imported into Jamaica after that island had enjoyed an immunity from it for fifty years: again St. Heineken states that across the vast wretched description abroad in the Island of Madeira, that they are afflicted with almost every disease, tormented by flies, and heat, and thirst and famine yet no mad dog has ever been seen there. The arguments to be deduced from these facts would seem to be strong ones, but the facts themselves have been contradicted in several instances. Thus, the Committee of Public Hygiene in France, sent sanitary commissioners all through the East and they unanimously report that rabies does exist there. Mm. Pencil, Amatin and Bourquiers have observed it in Egypt; M. Liguist at Beyrout; M. Guil-lardat and Picara at Damascus; M. Camusseau at Smyrna, and so on. And it seems even probable that the disease has been known there from time immemorial, for certain receipts, considered as specifics for the malady, are still the private property of different families.

families, who hand them down as Heilons. It is more than probable that the denial of its existence in other countries, is the result of equally hasty, incorrect or false observations, and that further investigations would prove and confirm its existence. Why should we deny its spontaneous development? In a practical point of view it would be a most dangerous statement to make public; and as a matter of scientific enquiry it seems so firmly established that numerous cases have occurred, where dogs in confinement, or in places where no rabid animal could have had access, have gone undoubtedly mad, that we cannot but believe in its occasional spontaneous explanation. Besides is it possible to deny or dispute its spontaneity of origin in the wolf who lives isolated and solitary in the woods? or in the case of the cat that went mad after an extensive turn? or that other case, where a cat became rabid from her kittens being taken from her, and the draught, and gave him the disease? Such examples, even in default of more direct proof, would, by analogy, authorize us in admitting its spontaneous origin in the dog. If being granted then that such cases may occur, let us go on to consider:

What are the conditions that cause or influence
it

its development? And finally what influence has
Race? this question has often been treated and might
be of importance, could it be determined which would be
the superior breed of dogs to keep. But we have no trust-
-worthy information on the subject; all we know is that
a large proportion of the cases of hydrophobia in man,
have been communicated by house-dogs, properly so called
living in the same stable, taking much food and little
exercise and partaking in some measure of the habits of
their masters. Close confinement is mentioned amongst
the causes, and deprivation of Caech grass the natural
medicine of the dog; also feeding on rank insubstantial
food. Some ascribe the appearance of the disease to
extremes of temperature either heat or cold; many at-
-tribute it to the great heat of summer and autumn
and think it more likely to appear in the dog-days,
and to be "a sort of dog-mania leaving the same relation"
"to Sirius, that insanity has to the moon, which indeed"
"in another sense is probably true (Mays)" others again
deny the influence of temperature, and hold that rabies
is as common in spring, autumn and even winter as
in summer; and Dr. Lullier even states that January
the coldest, and August the hottest, month in the year
are the very months which furnish the greatest examples
of the disease. There is no doubt however that rabies does
occur

near frequently during the hot weather, thus in the
 report to the French Academy of Medicine, before
 referred to, it appears that two-thirds of all the
 cases reported, occurred during the months of June,
 July and August alone. Still whilst admitting the
 influence of the hot season we must not ignore the
 proportion of cases (one-third in the above cited
 report) occurring at other seasons; and it would
 be a great and great mistake to restrict preventative
 measures to the hot months alone. Again the disorder
 has often been ascribed to want of water in hot weather,
 and sometimes to want of food. Bro. Dupuytren, Brecher
 and Magendie however have caused both dogs and cats
 to perish with hunger and thirst without producing
 the smallest approach to a state of rabies. And further
 the following experiments at the Alfort Veterinary School
 seem conclusive enough: three dogs were chained up
 under the full blaze of the sun in the heat of summer;
 to one salted meat was given; to the second water only;
 and to the third neither food nor drink. They all
 died but none of them became rabid.

Finally we have as a cause, the deprivation of sexual
 intercourse. Of the influence of this on the etiology of
 rabies there can be no doubt, supported as the assertion
 is by popular evidence and the authority of distinguished
 characters.

observers. In France and Germany where the proportion of male to female dogs is between 3 and 4, to 1, rabies is fourteen times more frequent in the male than in the female. I am not aware of the exact proportion between the sexes in the canine population of Great Britain, but from observation, and from knowledge of the very general habit of rearing male puppies in preference to females, I have no doubt that the same proportion say 3 to 1 holds good for this country as well; and, as is proved for Continental countries, he cannot but believe that here also, this disproportion between the sexes, disproportion which does not permit the males to satisfy their sexual desires, has a great influence over the development of spontaneous rabies. We do not as the length of some who give so great a preponderance to this cause, as quite to ignore all others, but we do think that whilst habit, climate, season, class, confinement, unwholesome food, want of larch grass &c, constitute etiological elements of no little importance and by no means to be neglected in considering the subject, yet that forced continence is at the root of the evil in the vast majority of cases. And possibly the pampered condition of house dogs, the heat of the weather &c act as causes of rabies in great measure by exciting or increasing sexual desires, which from

the paucity of females there is little or no opportunity of appearing.

What are the symptoms of rabies in the dog?

The importance of a knowledge of this point is obvious and the more widespread it can be made amongst the public the better, that the disease may be recognized in its earliest stage, and the animal prevented from spreading the infection. The description published in the British and Foreign Medical Review, and more recently in Prof. Miller's admirable "System of Surgery" is so plain and at the same time so complete and exhaustive that I cannot do better than quote it at length. "The disease is said to be of two forms. The first is characterized by augmented activity of the sensorial and locomotive functions, continued and peculiar barking, and a strong disposition to bite (the *Rauend Wuth*, or raging rabies of Hertwig) The affection commences with some alteration in the peculiar habits and disposition of the animal, who, as the *Cau megle*, is more irritable, more tractable, more lively or more sluggish than usual; or these several conditions may alternate in one and the same animal. An early symptom consists in an inclination to lick, or carry in the mouth, various inedible substances, especially such as are cold. The animal after a time gets restless; snarls in

in the air, as if at this, frequently leaves the house
 but soon returns; and is obedient and seems attached
 to his master. According to Blaine, constipation con-
 stantly occurs. There is usually complete loss of
 appetite; but the animal seems to suffer from thirst,
 drinking eagerly, until, as indeed usually occurs, the
 mouth and tongue become swollen. The eyes are red, and
 become dull, haggard and half closed, the skin of the
 forehead being also wrinkled, which gives the animal
 a peculiar aspect. The nose, tongue, and throat, now
 usually become swollen; and the coat becomes rough
 and staring. According to Burtwig, the mouth is generally
 very dry; but Blaine has constantly observed a flow
 of thin saliva. After some time the gait becomes unsteady
 and staggering, and finally the extremities are paralyzed.
 The tail, in this form of the disease, is not drawn between
 the legs; and the head is carried erect; the nose being
 pointed upwards. A disposition to bite, sooner or later,
 invariably occurs; it is not however, permanent, but
 recurs periodically; is directed against both animate
 and inanimate objects; most especially against the cat,
 but as towards other animals, and least of all towards
 man. When the animal bites, he does not previously bark
 or fly at the object of his attack, but approaches in a
 quiet or even friendly manner, and makes a sudden snap.
 The

"The second form of the disease is distinguished by
 "inactivity and depression (the still Wuth, still or
 "calm rabies); there is no disposition to bite - probably
 "from the lower jaw being paralyzed; nor is there any
 "inclination for change of place manifested. The first
 "symptoms are unusual quietness and apparent depression
 "of spirits. The voice is peculiarly altered, as it is also
 "in the foregoing variety, but there is much less disposition
 "to bark. The mouth is open, the lower jaw hangs as if
 "paralyzed, and is raised only under the influence of
 "strong excitement; there is a constant flow of saliva
 "from the mouth. The animal either does not drink at
 "all, or does so with difficulty; but manifests no fear
 "of water, and, on the contrary, willingly immerses
 "the nose in that fluid. The tongue is almost constantly
 "protuded from the mouth."

There are some errors and superstitious in the mind
 of the public, in regard to this subject, that may be
 alluded to. Thus, if a dog be seen in a fit in the street,
 some one suggests that he is mad; the cry is raised;
 and the wretched dog is killed off hand. Kew & Quatt
 says the rabid dog never has fits, but that the existence
 of epilepsy is a clear sign that there is no rabies.
 Again it is a popular belief that a mad dog will shun
 water, but as we have already seen, this is a mistake.
 The

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The fact is that in quadrupeds there is no "hydrophobia" no dread of water, no spasms in swallowing it; but on the contrary they are tormented by a burning and unquenchable thirst, fly eagerly to water, (with perhaps an occasional exception in the horse), and unless the jaw be paralyzed, drink with ease and increased avidity. This error is obviously a dangerous one, inducing the belief that if a dog do not show water he cannot be mad, and may be approached with impunity.

Another dangerous doctrine held by many, is that a mad dog will not bite his master. Certainly at the commencement of the malady he shows no tendency to do so, but on the contrary exhibits even more affection than usual, and is only dangerous from his lickings. But later, the disease sets the better of him, and he snaps perhaps involuntarily, at all who approach, and statistics, up to to 1822 at all events show that in 8 cases out of every 10 the disease was communicated by dogs to their masters and keepers.

Again there are other superstitious opinions not at all uncommon, viz: that healthy dogs recognize and fly from a rabid one in obedience to some mysterious instinct of self preservation, warning them of their peril; this is quite unfounded. As usual the ideas that a mad dog always runs with his tail between his legs - that he

He is quite insane and unable to perform his usual duties, - that he exhibits a peculiar offensive odour de se.

Some French authorities lay a good deal of stress on the dog-trial (L'épreuve du chien) of rabies. This consists in presenting a dog to the suspected one, to see if it will throw the latter into a paroxysm of fury. Hauley who principally asserts the value of this as a diagnostic sign, says that he should not conclude that a suspected dog had not rabies, because he remained insensible to the sight and presence of another dog, but that if the converse took place it is of much importance. That a mad dog or tiger will attack another dog in preference to any other animal. And that if "L'épreuve du chien" produces madness and fury in a suspected dog, it is a sign of great diagnostic value.

To conclude then, the earliest symptoms of rabies in the dog seem to be, sullenness, restlessness, continual change of posture, a steadfast suspicious gaze or glare (spectral illusions?), and an earnest, incessant licking or scratching of some part, on which a scar may generally be found. Whilst the most invariable and characteristic symptom is the rough, harsh, short hair, suddenly changed into a short hawl. The dog dies within the first week, usually on the 4th, 5th, or 6th day.

What measures should be taken to prevent its origin and propagation? With this end in view various measures have been employed at different times. The sequestration of every dog known, or suspected, to have been bitten by a rabid animal, has long been recognized as a necessary, indeed an indispensable, precaution. Killing the dog at once under such circumstances may perhaps be rather too severe a measure, for the suspicion against the animal may be unfounded, or again, as we shall presently see, although bitten it may not take the disease, - but it should be undoubtedly be shut up and carefully watched, and that certainly for not less than sixty days; for better and safer however to extend the probationary period to six months, for many cases are on record where the disease has not broken out for some months after the inoculation of the virus. This precaution then should never be omitted, but it is obviously difficult to enforce: thus, a dog under an attack of rabies, perhaps spontaneous and unsuspected rushes out into the streets &c, snapping at all the dogs and other animals it passes in its mad career; in such a case, how discover, and enforce the confinement of, all the animals that may have been infected?

Then muzzling; much stress has been laid on the enforcement of this measure, and the report of Dr. Renault

seemed to confirm the belief in its importance. He attributed the disappearance of rabies in Prussia to the rigorous enforcement of the law in this respect. But he was in error, for in a letter dated June the 1st 1862, the French Ambassador in Prussia states that the law of the muzzle, far from being general throughout the country, was limited to the city of Berlin and two or three other chief towns; and that even in Berlin dogs need not be muzzled in houses, hotels, omnibuses, &c; and that according to the majority of Prussian physicians and veterinary authorities, it is an "illusory and inefficacious measure" to which no influence can be attributed in the non-development of rabies. It is useless during the period of incubation, and when the access comes no muzzle can resist the furious struggles of the rabid animal; he breaks it off, and is free to spread the seeds of the terrible disease broad-cast on his path. The muzzle is no doubt very useful for some purposes, as, to prevent dogs fighting, biting animals, strangers, &c; but its use is certainly "illusory and inefficacious" in the prophylaxis of rabies.

But the great reason why the foregoing measures are insufficient, is, that they are powerless to prevent the spontaneous appearance of the disease. It is all very well to muzzle dogs, and to prison or sequester those

these suspected of having been bitten or otherwise infected, but we want something more. How is the spontaneous development of the disease to be prevented?

Lascation, was suggested. The imposition of a tax for dogs, so as to diminish their number. That experience has proved that their numbers have not been sensibly lessened, and that rabies is as frequent as of yore.

Besides there is no necessary relation between the canine population of a country and the number of cases of hydrophobia in man that occur in it.

To cite an example amongst many; in the department of La Vendee in France, where there is 1 dog to every 3 inhabitants, the disease is extremely rare, whilst it is common enough in Lyons and Paris where the proportion is only 1 dog to 11 inhabitants.

We want something more, something to strike at the root of the evil. Let us look to the etiology of the disease. In considering that point we see that the chief cause of the development of spontaneous rabies is the deprivation of several intercourse, which results from the large preponderance of males over females in the canine population. It is in that direction then that legislative measures should be taken. The public should first, as a subsidiary measure, be warned of the danger; and then an unequal tax should be levied,

a tax higher for male than for female dogs. Thus without any inconvenience arising, the equilibrium between the sexes would soon be restored, or even an excess of females created; and this fruitful source of rabies would be effectually and permanently removed.

Let us now consider some points concerning the disease in the human species, and first:

What is the mode of contagion? Hydrophobia in man, as we have seen, is always the result of inoculation of a virus. The most usual and dangerous mode of injury is by a bite, especially on an unprotected part. But a bite is not essential, the application of the poison to an open surface of any kind being quite sufficient. Some have said that the virus will act through sound mucous membrane; horses are said to have died mad from eating straw upon which rabid pigs had lain; Portal was assured that two dogs were attacked with rabies a few days after licking the mouth of another dog that was rabid; and Dr. Gilman of Highgate, in a pamphlet on Hydrophobia, quotes an instance from St. Perceval, in which a man dog licked the face of a sleeping man, near his mouth, and the man died hydrophobic, although the structure search failed to discover any scratch or abrasion. Thus the opinion of the best authorities is on the other side, and

It seems most probable that, in such cases as the above, there must have been some chaps or abrasion, though minute and undetected, through which the virus found entrance, and that it is inert on sound skin or mucous membrane. It is uncertain whether the poison is contained in the saliva alone, or whether all the solids and fluids of the animal are not poisonous also. The cases where the disease has followed a scratch from the claws may be explained by the well known fact that animals are very apt to put their paws to their mouths when they feel uneasy there, and thus the poisonous saliva may have been introduced by the scratch of the nails.

There seems some reason however for believing that the disease may be communicated by the mother's milk: thus two cases were bitten by a mad dog; one of them had two lambs, the other, one; both the cows died rabid, and so did all three lambs a week afterwards, altho' they had not been bitten by the dog, nor as was supposed by the mothers (Stech, Med. Gaz. 1839),

For a long time surgeons have recognised the tall nature, virulence and danger of some bites, and it seems certain that a disease, if not rabies, at any rate so like it as in no way to be distinguishable from it, (Moye non-irritante, of the French), may occur in a man or other animal, after a bite from a dog, as he not
mad,

mad, has infuriated at the time it inflicted the wound. Watson, Lardier, Camille Gras and others give cases of this kind, where, some weeks after a man had been bitten by a healthy but irritated and angry dog, the patient was seized with hydrophobia and died, the dog remaining calm and well at the time of his illness and death. This is a point of extreme importance, showing the mad run by children, who innocently, and adults who maliciously, trace and irritate animals. More facts are required on the subject. May there be in the dog a kind of sudden instantaneous, transitory madness, analogous to the transitory delirium or temporary insanity sometimes seen in man? We know that in the human subject vivid emotions produce sudden modifications in, the secretion of the tears, urine, sweat, gastric and intestinal juices and the saliva, sudden cutaneous eruptions, epileptiform attacks and instantaneous clampitic seizures; - why then may not pain or fury, acting through the nervous system, cause, in animals predisposed as dogs and cats seem to be, a sudden perversion of the luccal or salivary secretion, to such an extent as ultimately to produce rabies in an animal inoculated with it? We know enough of the etiology and mode of explanation of spontaneous rabies

robis, to be authorized in denying that it may break out thus in a sudden and transitory form, under the impression of violent emotions?

What becomes of the inoculated virus? Is it absorbed into the system, and does it there diffuse itself and mature till the disease breaks out? or does it remain in the wound as cicatrix for a time? The probability is strongly in favour of the latter opinion. For when a poison is taken into the blood it soon is eliminated by the excretories, or if not, lodges in some organ or other and presently disturbs its functions. But we know no instance where a poison circulates in the blood for so long a period, and then gives rise to symptoms so specific. Besides the wound or scar is often seen to reimprove, sometimes with the inflammatory action extending along the lymphatics towards the heart, and shortly after the disease appears. So the strong presumption is, that the poison remains where it was first deposited (perhaps in temporary chemical union with some of the tissues?) for a certain period, and that then recrudescence takes place, and it is taken up by the veins or lymphatics and enters the system; or, according to M. Piarry, a modification in the nerves of the wound, a vibration, "une neuropathie," (from $\pi\alpha\lambda\lambda\omega$, Squier?) is the first phenomenon

phenomenon of each paroxysm, thence the nervous
 oscillation extends to the cerebro-spinal axis and
 thence to the nerves of the head and neck. Whether
 the virus act through the veins, lymphatics, or nerves,
 is of comparatively little importance, the principal
 point being that for a time it remains inert and
local.

Do all persons bitten by rabid animals necessarily
become affected by the disease? By no means; even
 if no precautionary treatment be employed. A number
 may be bitten at the same time by a mad dog, and only
 a few, perhaps none at all, may contract the disease.
 Curiously enough different species of animals seem
 susceptible in different degrees. Thus Youatt says
 two dogs out of three bitten by a rabid one, go mad.
 The majority of horses inoculated, perish; Cattle have
 a better chance, a full half of those attacked by mad
 dogs escaping, probably from their loose skins being
 less easily penetrated. With sheep the bite is still
 less dangerous, the virus being wiped off the tooth
 in its passage through the wool. Man is least of
 all susceptible. John Hunter saw an instance where
 25 persons were bitten, but 1 alone was affected, and
 he gives that as ^{about} the probable average proportion, viz
 5 cases, he says, of hydrophobia for every 100 persons
 bitten;

Witten; Dr Hamilton gives the same proportion.
 But these computations are much too small: thus
 in 1780 a mad dog near Senlis bit 15 people and of
 these 3 died by hydrophobia; 1 in 5 then or 20 in 100;
 Renault gives the ratio of 33 to 100; and Lardieu
 gives 185 cases of the disease amongst 334 people
 bitten or scratched over 55 in the 100. — The person
 first bitten seems more liable to the disease, more
 virus being probably lodged in the wound.

The part bitten too makes a difference, a bite through
 clothes being less formidable than one on an unpro-
 tected surface, probably from the cloth wiping off
 some of the virus; and of course the thicker the clothes
 bitten through, the more likely this is to happen.

In a case described by Dr Oldknow of Nottingham
 in which a man was bitten in three places by the same
 dog, viz in the scrotum, thigh and hand, — the bite
 on the hand was the last, and it seems not improbable
 that but for it he might have escaped, for hydrophobia
 occurred only in the hand and arm. The dog is supposed
 to have closed his mouth after inflicting the first two
 wounds, and thus to have charged his teeth afresh with
 the poisonous saliva. In an American report of 75 cases
 the injury was on the hand in 40 instances, on the face
 in 15, the leg in 11 and the arm in 9. And in a
 French

French report of 214 cases, the wound was on the upper extremities in 122, the face in 34, and the lower extremities in 38.

What is the period of incubation? To this enquiry no very precise answer can be given. Cases are recorded at intervals varying from 8 days, to 3, 4 or even in one case by Wardley 12 years; but in these last cases it is now probably that there was some intercurrent but unsuspected inoculation. Romberg gives an analysis of 60 cases, showing as the shortest period 15 days, the longest 7 and 9 months, and the average 4 to 6 weeks. Lardier in a digest of 224 "well determined cases" in which the period of incubation was less than a month in 40 cases; 1-3 months in 143; 3-6 months in 30; and 6-12 months in 11. He concludes that in most cases the disease appears during the first two weeks after the inoculation, and rarely later than three months. Prof. Miller gives as the average, between five and ten weeks. - It seems that the younger the patient the shorter is the period. Thus in children from 2 to 3 years of age the average is from 15 to 20 days; from 7 to 11 years, 20 to 30 days, and so on.

What is the prophylactic treatment? Almost every drug in the Pharmacopoeia has been tried, at one time or another, as a prevention of this disease, but in

in none can any faith be placed. Mr. Guatt however experimented on dogs, with the *Saccharia Latifolia* (which Dr. Spalding an American physician had found highly successful as a preventive of rabies) combined with Belladonna, and earnestly recommends its employment. And in cases of doubt and fear where something must be given, this should not be rejected.

In all cases of suspected inoculation from a bite, strict inquiry should be made into the circumstances, and the condition of the dog should be carefully investigated. The animal should be kept under surveillance for some time, if it remain well for the fifty days, the usual probationary period, it may be shown to the patient as a powerful means of removing his anxiety and fear; indeed if the next few days pass over without the dog becoming rabid, we may conclude that the wound is an innocent one as far as least as the risk of Hydrophobia is concerned.

In all cases of doubt it is far better to err on the safe side, and take measures, severe though they be, to avert the possible evil. What are these measures? The early and complete destruction of the presumed wound, by excision or caustic: excision of practicable, as being most certain. A probe or other instrument being put in the cell made by the tooth, and

and completely cut out with its containing cell. An evacuated cupping glass should then be applied to promote the bleeding. If there is any uncertainty as to the whole of the affected part being removed, caustic should then be freely applied. If excision be impracticable let the wound be destroyed by strong nitric acid, or better Potassa Fusca; some use the butter of antimony; the French like the actual cautery. M^r: Guatt preferred Nitrate of silver, which may act chemically on the virus, rather than locally on the tissues (Prof. Miller). If the part, as a finger or hand, be so lacrated that efficient excision or cauterisation is impossible, amputation should be resorted to (Kulpack). Along with this local treatment, if it be thought proper a course of sweating (by vapour bath and opiates) and purging may be resorted to, as M. Guachin has done in his "Hôpital Necker" with apparent success. In all cases the mind of the patient should be soothed, and his fears allayed as much as possible.

It is then the duty of the surgeon to destroy the infected wound as early as possible after the inoculation; but if the patient be not seen for some time after, should he still excise? Yes, certainly, if it be only a few days after. The limit is hard to fix.
 experience

experience of the results of late excisions being so liable to fallacy, all persons inoculated not being certain to contract the disease even if nothing be done.

In general terms however it may be stated, that if the patient be seen within the first fortnight, the wound or scar ought to be fully excised or cauterised; but if not seen till later, and especially if not for 20 or 40 days, it had better be left alone.

The satisfactory results of early destruction of the wound are shown by the following statements, amongst others: Of 115 deaths from Hydrophobia, 84 were in persons who had not been cauterised; 37 in persons in whom it had not been resorted to till late; and the 14 it has been done imperfectly (Lardier).

While of 400 cases of bite, cauterised, not one was followed by the disease (Gouatt). Again Dr. Catalan gives an instance where 16 people and an ass were bitten by the same mad dog, the 16 people, whose wounds were immediately cauterised by a red hot iron, escaped; the ass was not cauterised, and died rabid.

It was asserted by Dr. Macochetti, a Russian physician, that between the 3rd and 9th day, after a person has been inoculated, little pustules appear on, or about, the frenum of the tongue, containing a small quantity of serous fluid: he held that the poison is there deposited
for

for a time, and then subsided, and proposed to present this re-absorption. He gave the patient loose doses of the decoction of broom-tops from the very time of the bite, and watched for the appearance of the pustules, opened and emptied them, and then cauterised them with a red hot iron, and afterwards made the patient gargle his mouth with the same decoction of broom-tops. These pustules have been seen in the dog; and Dr. Magiatiel of Santos has also observed them in men, but all others have failed to do so. The truth seems to be that the mucous follicles of the mouth generally and those beneath the tongue perhaps in particular, are commonly enlarged in the dog, and also perhaps in the human subject, labouring under the malady, and these exaggerated follicles were regarded by the Russian physician as a specific eruption, furnishing the virus and pabulum of the disease.

We have seen, then, that as Hydrophobia must be regarded as an incurable disease, our attention should chiefly be turned to its Prophylaxis. That if inoculation has taken place, the early and complete excision or cauterisation of the suspected wounds, is the best means of averting the threatened evil. But we have also

also seen that the melody in the human species is
 always the result of inoculation; - inoculation in
 the vast majority of cases from the dog. And
 therefore to prevent the complaint in that animal
 must be our object, thus obviating the possibility
 of the disease being communicated to man, the
 necessity for severe surgical interference, and the
 risk of its proving unavailing. This end is to be
 attained: by the seizure, by the police, and sale
 of all dogs straying in the streets without a collar
 properly inscribed with the owner's name and address;
 by the instruction of the public mind in the symptoms
 especially the prodromic ones of rabies; by the seques-
 -tration of all dogs known or suspected of having been
 bitten by a mad one; but above all by the imposition
 of a notable tax for male dogs, to restore the equilibrium
 of the sexes, and thus remove the most fruitful source
 of the disease. - It is thus that we may best hope to
 attain our end, and to realize the words of the emi-
 -nent medical jurist, M. Tardieu: "La race est un de-
 -" *ce fléau dont il est permis à la science, et à*
 -" *une administration vigilante, de poursuivre l'ex-*
 -" *termination. La rage doit disparaître, la race*
 -" *disparaître.*"