

cases successful when commenced sufficiently early, but the parasites are so small as to be easily overlooked, and the loss of condition and diarrhoea are apt to be attributed by the owners of infested animals to some temporary and trivial cause.

I have occasionally made a *post-mortem* examination of one of these cases, where the animal has never been under treatment, not having been considered sufficiently ill to warrant the employment of professional aid.

### CANINE RABIES IN INDIA.

By Surg.-Capt., J. C. VAUGHAN, I.M.S., Deputy Sanitary  
Commissioner, Western Bengal.

THE reading of a paper on rabies in India in the issue of this Journal for September 1895 has induced me to offer the following notes, which may perhaps prove of some interest.

I do not mean to offer any criticism of Vet.-Lieut. Martin's remarks in the paper above alluded to, but merely to set down certain facts which have come within my own experience. And while my own observations of the symptoms of rabies in dogs agree for the most part with his, there are also certain other points to which I would draw attention.

One of my earliest experiences of rabies was as a child, when one of my near relations was bitten on the face by one of our house dogs which was obviously rabid. The case was treated by my father in a manner afterwards to be referred to, and with a "successful result." My next experience was that of a big powerful man who died while under my treatment. All doubt in this case as to the diagnosis was set at rest by the history, and also by the results of experimental inoculations with portions of the medulla from the case. I was so impressed by this case that I have ever since made a point of carefully observing and noting all that has come in my way in the shape of canine rabies.

During the seven years or so of my service in India I have always kept dogs, and have lost four very valuable animals from rabies. As all these animals were valuable dogs, they were all kept as long as possible before being destroyed; and as their clinical history was much the same in all the cases, I will briefly summarise, and dwell only on the main points.

They were all large dogs. Three were of a cross between English greyhounds and Indian Rampore hounds, one was an imported Kangaroo hound, and all were of very docile temperament.

In every case the first thing which aroused my suspicions was an excess of freshness, a greater than usual display of affection for their master, and if anything a somewhat increased display of vigour and vitality in all they did, albeit combined perhaps with a slight nervous excitability in their manner; but there was no irritability or snapping at other dogs. With this there was, perhaps, a tendency to bark too much for no ostensible reason, or to bark now and again in isolated barks for nothing.

I have seen a good many rabid dogs, but have never noticed

the preliminary catarrh Vet.-Lieut. Martin speaks of. It did not occur in my dogs, in all of which the symptoms above detailed always appeared first, and always awakened suspicions, and that, as the event has proved, never as a false alarm. The leaving of food has in my experience always been a later symptom. My dogs have always been regularly hunted, and are always in the best of condition, and the symptoms above stated have always struck me as the first suspicious signs.

This excitability has shown a steady tendency to increase, and within twenty-four hours or a little more the look of increased "being alive to all about him" in the dog's eye has become dulled, and replaced by a kind of half-drugged "looking far-away" expression in the eyes and face, which is strangely out of keeping with the still somewhat restless and slightly excitable manner. At this stage, in my cases, the food has been eaten with an increased greed and haste; and though there has not been any tendency to attack other dogs so far, I have in two cases noted the dog to have developed a peculiar antipathy to the fowls and ducks about. There is still the curious isolated purposeless occasional bark, and although Vet.-Lieut. Martin says he cannot recognise the "rabid howl" of text-books, there is about this time a distinct change to my ear in the timbre of the full bark, which is distinctly hoarser in the loss of the higher overtones, and reminds one of nothing so much as of the brassy voice in the cough in advanced aortic aneurism in man. In short, this voice condition is the first symptom of the weakening of the muscular innervation of the pharyngo-laryngeal region which is so distinctive of hydrophobia. At this time also may be noticed a frequent movement of the tongue, the dog "licking up the saliva in his mouth," as a friend once put it to me. Gradually the excited manner quietens down, and the whole deportment becomes more in keeping with the drugged look in the face and eyes, but the old excitement still occasionally breaks out, and the eyes flash up with a dull light in them.

So far we have reached the end of the second or third day. Now there is a period in which all excitement seems almost entirely to subside, but there are tremors in the limbs, subsultus tendinum in all four legs, and perhaps a quivering of the lower jaw, with a troubled restless snatchy sleep or doze, from which the dog awakes more restless than ever. He is now "quite mad," the old excitability has more than returned, the dead dull look is still in his eyes, which, when his attention is directed to anything, flash up wide open with dilated pupils, but the dull expression is not quite lost, and the contrast between expression and action, the now staring coat and "tucked up" appearance, and the slight stagger of the hind quarters which has now also developed, all together make up a picture it is hard to mistake. The brassy toneless bark has lost its overtones, and is constantly repeated in many cases, especially if the dog be tied up. The dog now refuses solid food though he may still take rice or soup. The temperature is raised, the urine high-coloured, and the *faeces* almost black. Though still docile, and glad to receive his master or visitors, perhaps with wagging tail and exalted demonstrations of affection, and if so, piteously out of keeping with his facial expression, it is now that he becomes uncertain. His jaws, perhaps, snap together on the coat sleeve he is licking in his excited affection, and he

bites without meaning to. If he attacks an unwary dog venturing near, it is with the same exuberance of action and mad display of whatever feeling is for the time uppermost, affection or animosity.

From this time on he seems gradually to lose his self-control, and so gradually becomes more and more dangerous. Even at their very worst, my cases have never altogether lost control of themselves, and I have gone, carefully gloved, up to my worst cases, and patted them and led them, and even when they have been secured with double chains and collars they have still known me and been quiet; but they have snapped their jaws on me, unintentionally, as shown by their manner, and have shown that the mental change—if one may use such a term for a dog—is essentially one of excitement with loss of control. The paralysis of the hind quarters and of the pharyngo-laryngeal region increases, and the period of excitement passes more or less quickly into one of deepening stupor, from which there are often sudden convulsive awakenings; the intervals between these grow longer, and finally death closes the pitiful scene.

I have watched the whole course of the disease carefully to the very end in one case of my own, and also in another case. In my other three I shot the dogs when they became unmanageable by the servants. I always tied them up when the dull look came into the eye, though I had watched them very closely before then.

It is clear that the disease I have sketched is the form known as "furious rabies." Dumb rabies begins much in the same way, in my experience. The restless sleep seems to me the turning point, and the dog wakes up paralysed and with dumb rabies, or with the "furious" form.

To my mind a very dangerous period is while the dog is in the preliminary stage of excitement, just before his expression changes, for the nature of the case is then so hard to recognise. But that it can be recognised is shown by my four cases, which occurred in November and in December 1892, in September 1894, and in September 1895 respectively.

The last case was that of the kangaroo hound. There were six of us at dinner after a day's shooting, when the dog suddenly came into the room, quietly enough, and one of the company called him to him; I then noticed the curious exuberance of the dog's manner, while being petted, and immediately stopped his familiarity and had him taken home and tied up. I did not then express my fears to our host, but my diagnosis proved fearfully correct. My servants would not believe it, but next day, when the brassy purposeless bark rang out, my head servant exclaimed "Sahib, 'Knight' is barking like 'Donovan,' who went mad so suddenly; is he going mad too?" I was evidently not the only one who had noted the peculiar bark of rabies!

I am aware that there are probably many points, which I have not touched on, such, for instance, as the eating of straw, chips of wood, apparent and perhaps real insensibility to pain and to certain stimuli, and hypersensibility to other stimuli, such as the mere whisking of a handkerchief over the face, and so on. I have not touched on "dumb madness" either, but my intention has been rather more to dwell on the preliminary or earlier symptoms, than to attempt anything like a full clinical treatment of the subject.

A point of very great importance which I would next touch on is

the question of the immediate treatment of bites from rabid or doubtful animals. With my own dogs out jackal hunting, or in the case of bites received in any way and at any time, my plan has always been to wash the wound freely at once, or as soon as possible, and then to burn it, not with solid nitrate of silver as is the usual practice, but with fuming acid nitric fort., or acid hydrochloric fort. Even in the case of bites from rabid dogs this plan has effectually prevented hydrophobia. It was the plan adopted in the case of my relative still living, referred to above as bitten twenty-four years ago by a rabid house dog.

On one occasion a dog obviously rabid "ran amuck" straight through my house biting everybody and every dog that came in his way. The dogs bitten were similarly treated, and none took hydrophobia.

I don't think the same trust can be placed in nitrate of silver, and for this reason. Let us suppose we are dealing with a deep bite from the long canine fang of a dog. What has happened? The tooth, a blunt instrument, has been driven by main force through the skin into the tissues, and, when so driven in, was coated with the poison-containing saliva, which was forced into the intercellular spaces of the tissue penetrated by the tooth, and although some of it lies in the wound cavity or lines the edges of the wound cavity inside, some or most of it has been jammed into the intercellular spaces around that cavity, and lies deeper in, in the tissues. The wound cavity in the meantime is filled with, and its sides wetted with, serum containing albumen. The nitrate of silver stick now penetrates into the wound cavity, reaches the saliva and serum lining its sides, kills the lining cells, and coagulates all the albumen within reach. The albumen film thus formed, forms, I submit, a protecting film which only protects the deeper-lying saliva and its poison; and in a deep penetrating bite shoving in a stick of nitrate of silver hard is very much like repeating the bite, and serves to drive the deeper-lying saliva only deeper still into the tissues, and so to place it farther outside, and hence better protected by the albumen-coagulum film, formed in the wound by the nitrate of silver treatment. If no albumen were coagulated in the wound the caustic would or might reach the farthest off and most deeply-lying saliva. But as nitrate of silver forms an albumen-coagulum, why not use an equally strong caustic which forms no coagulum? Hence the use of the fuming acid, which dissolves all albumen it reaches, and penetrates at once without the use of force into all the surrounding tissue spaces. The same holds good of all kinds of bites, and the penetrating acid kills all it reaches. One or two drops suffice for each bite, and the slough soon separates, and the clean wound then left heals readily. I have treated a great many bites in this way, and when my own dogs have gone mad I have invariably found that they had been bitten while I was away from home for some few days on some inspection duty.

Holding the views I have above indicated, I have always strongly objected to cauterising any bites with nitrate of silver, and have invariably advocated the use of strong acid. But whatever the immediate treatment it must be prompt. Otherwise, though a domestic animal may be kept under observation, for the human subject there is nothing for it but a visit to a Pasteur Institute, and the sooner India has one the better. How much does humanity owe to the beneficent genius of Louis Pasteur!