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M. D. THESIS.

The Prophylaxis of Rabies.

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In 1905 there was an outbreak of rabies in the Island of Penang with the result that several persons died of hydrophobia, while others, including myself, required to betake themselves to a Pasteur Institute for treatment.

At the commencement of the outbreak a Muzzling Order was brought into force, but fresh cases occurring this soon gave place to the more effective means, where there is a large native population and much of the country is sparsely populated and therefore sparsely policed, of requiring all dogs to be tied up or led, With the result that in a few weeks no fewer than ten thousand wandering unclaimed dogs were shot on the island, - showing a deplorable state of affairs, - and no more cases of bites from rabid animals occurred. Based upon the experiences of this time I propose to consider the steps now-a-days taken for the prevention of rabies and the prophylactic treatment of the rabic bite, and will especially lay stress upon the difficulties to be encountered in the detection of the disease in dogs/

dogs and the value of experimental incolution. What are the warning signs by which one may know a dog to be rabid? Pasteur remarks, in his communications to the Académie des Sciences, that "nothing is more varied than the symptoms of rabies", then the symptoms one may meet with of a disease in animals known by experiment to proceed from one and the same virus. From consideration of the multitude of symptoms given in books on the subject, that a dog may show in the early stage of rabies. from conversation with patients at Saigon, and from my own experience, I know of no advice that would safely assure people against being bitten by a rabid dog, unless it be the general one to the thoughtful observer, to quickly treat any unwonted behaviour ina dog with suspicion in a country where the disease is at all prevalent. One patient informed me the first thing he noticed, his dog was dull and dragging one of his hind legs. He took it to a veterinary surgeon who told him the dog had strained a tendon and gave him directions how to treat it. He returned home with the dog and while proceeding to carry out the instructions was bitten. The dog died of rabies certified. Another patient's statement was that his dog suddenly became mad, biting the legs of the chairs, and then quickly attacked himself, child, amd servant. In my own case, I was roused at night by my fox-terrier, a timid little animal, prowling about the room, and rose to put him downstairs. He obeyed in his usual slinking fashion, but as he passed bit me on both bare feet; a rapid succession of light nibbles sufficing only to draw blood/

blood at one place. I then remembered that six weeks before he had come home limping from a bite. Had it not been for what I might call a certain absent-mindedness about his fear as we endeavoured to catch him, and for the fact that after he was tied up he twice made a savage silent rush, which some of us standing too close narrowly escaped, I would have been still unconvinced, so much like his ordinary self was he and departed for quarantine in the morning without anything further unusual to be noticed about him. On the evening of that day the Government Veterinary Surgeon told me there was nothing the matter with him and that I must be mistaken. A notable fact this disappearance of the symptoms over a period of hours. On the following day I was called to witness him incessantly roaming round the Kennel, oblivious of my presence, gnawing at the iron bars, and at times jumping in the air as if catching imaginary flies, or stopping for a moment in an expectant attitude with a far away look as if intent on some distant sound. These unquestionable manifestations of the second stage of furious rabies developing in intensity to a pitiful degree further proof was deemed unnecessary and he was shot. Roux and Nocard (1) showed that the saliva is virulent at least three days before the onset of symptoms. A lick of the dog's tongue and a break in the epidermis may be all that is necessary for infection to result. Indeed two cases are cited last year (2) suggesting the possibility of infection through intact mucous membranes, though one is bound to think there must have been/

been some undetected flaw in the epithelium. The first sign of altered demeanour in a dog may be an unusual display of affection - "caressing rabies". It is evident then how easily one may fail to detect the early stage of rabies in the dog, that at this time man runs the greatest risk, and how also a dog may as the delirium begins to take hold of him, get away undetected in the ceaseless wanderings of his biting crusade, working endless havoc before exhausted emaciated and paralysed he comes to ground again.

Remlinger (3), the Director of the Pasteur Institute at Constantinople, states the reason why hydrophobia is not relatively more common in that city of the homeless cur is, not that their pariahs are more immune, but because the disease as a rule assumes the paralytic form amongst them, and the dog has not the power to harm of the roaming biter. But even in the much less frequent paralytic rabies, in which the furious stage is bridged over, and the first stage is ~~not~~ more likely to be characterised by listlessness than by agitation, the dog will bite when interfered with, before his jaw is involved by the advancing paralysis. Of course it is important that the dog should be kept under observation, when in most cases the signs of the disease fully developed will be unmistakeable, the animal dying within five days, and death, Keirle (4) states, is rarely prolonged beyond the 7th or 8th day, and never beyond the 10th. All evidence is in favour of Pasteur's statement that a dog may get well after showing the early manifestations of rabies, but never after the onset of acute symptoms. A case (2) is related last year of a child who died of hydrophobia five months after/

after being bitten by a dog not recognised to be rabic and which at the time of her death was in good health.

But the disease may run a sufficiently atypical course to leave the diagnosis in doubt. It may be that the symptoms are not sufficiently suggestive of rabies, or the disease may be simulated by some other dog distemper. As a rule however, the difficulty will crop up with animals found dead or killed under circumstances suspicious of rabies. I therefore think it of much importance in a country where the disease is at all prevalent, and especially if there be no Pasteur Institute near at hand, that gentlemen in the official capacities of Medical officer of Health and Veterinary Surgeon should be prepared to carry out the almost certain test of experimental inoculation in all cases of doubt. In rabies we have an excellent example of the value of laboratory work in the diagnosis of infectious disease.

Not that one would have a person bitten by a dog suspected of rabies delay for the termination of an experiment that must last at least fifteen days. One must give him the benefit of the doubt and advise him to proceed at once to the nearest Pasteur Institute; and if desired the dog's brain may be sent after him in glycerine, not in spirit, as Dr. Braw the Director of the Pasteur Institute at Saigon told me, is the medium in which they frequently arrive. But it is for the sake of getting hold, at the earliest possible opportunity, of the first links in the chain of evidence that rabies exists, and therefore with the best hope of stamping it out with a minimum of damage done. Why, unless by importation from an outside source, rabies should re-appear after many months of freedom from/

from the disease is a question in the present knowledge of the workings of Infection difficult to answer, and the difficulty is not lessened by the fact that the specific morbific agent yet remains undiscovered. No one now-a-days would advance the theory of origination de novo; nor is infection through the air a likely possibility. Nor is there evidence that the virus is resistant upon fomites and likely to be conveyed by that medium to any far-reaching extent, though, speaking of fomites, the case of the man who contracted hydrophobia from biting, the knot of an infected rope is noteworthy. The probability is that it is almost always communicated from inoculation by a bite. Majendie (1) showed that virulence diminished with the passage from dog to dog, until the fourth or fifth dog in the series failed to take the disease. Perhaps in this attenuated form it is transmitted, until some day, by agencies yet unknown, the former virulence is again acquired. "The (5) resulting disease is the product of the sum total of the character of the infecting agent, on the one hand, and of the subject of infection on the other". While realising the truth of ths broad axiom, one also realises the infinite scope of the possibilities it suggests. On the other hand, many cases of rabies must remain undetected, and in many cases ~~the suspected cases~~ (~~the suspected~~ presence) of the disease is not reported to the police. Concerning this question of Infection and the value of inoculative experiment, the reports of the British Board of Agriculture for I900, I90i and I902 are most instructive reading. I will give the following extracts:

No case of rabies confirmed during I900 in England or Scotland. In Wales there was a recrudescence of the disease in the summer and autumn months. From time to time in the spring reports of cases had been received, but the evidence obtainable was insufficient to

confirm the presence of the disease . (Here one feels, on reading, that if the value of experimental inoculation had been fully realised and vigoursly carried out, the sequal might have been avoided)

On August 2Ist a greyhound developed such market symptoms of rabbies that it was shot by its owner, who reported his suspicion to the police. The presence of the disease was afterwards confirmed by inoculative experiment. Then follows the report of many cases. Two conclusions are arrived at i,e, that all these cases had a common origin dating from about March and that it was introduced from some other country,(France for example still records two to three thousand cases a year) in spite of the utmost precautions of the Custom House and Dock Officials. This statement is also made"It is altogether opposed to the past experience of the Board that rabies should prevail for long in any district without manifesting itself". In I90I England and Scotland again remained free and only two cases were confirmed in Wales. The first: in January, occurred in a cow at a farm not far from where rabies had been confirmed in October of the previous year. Besides, other animals on the farm had died under suspicious circumstances. The second case occurred in March, An ownerless cur, and the source of infection not discovered. For the following nine months Great Britain enjoyed a complete immunity from rabies. But then comes the report of I902, when we find, beginning with a case in January where the source of infection was not discovered, the existence of rabies clearly established, and there is a long list of cases until June.

Here/

Here there is a break until November when reports are received giving rise to grave suspicions, which are confirmed by inoculative experiments conducted by the Boards Veterinary Officers. (The authorities have evidently now become fully aware of the value of experimental inoculation). It is thought that these latter cases might be traced to a dog reported in that district in the summer as suspected of rabies, all traces of the dog having been lost. ~~There~~ then follows in contrast to the statement I have quoted from the report of 1900 "Rabid dogs must have been at large in districts in which their presence had been undetected". On the 28th of May a man died of hydrophobia. It transpired that he had been bitten by a dog nearly two years previously in the same neighbourhood. The disease had not been recognised in the dog at the time but this sad event showed that it had probably existed undetected in that district at that date". (The moral is obvious, experimental inoculation would have saved the situation).

In proceeding to experimental inoculation, it is well that the operator should protect himself with rubber gloves. Fatal results have been recorded. Also that he should have a tub of disinfectant by him for the reception of all infective material, and that he should recognise all aseptic precautions, using flame sterilised instruments, in dealing with the central nervous matter of the dog and in operating upon the rabbit, lest septicormia intervene to falsify the result.

An/

An eye for comparitive post-morten appearances will here be of value, and while dissecting the dog he may note conditions which, though not in themselves conclusive, may furnish corroberative evidence. For example conditions described[1] that may be met with, are broken teeth. a dusky livid buccal muscous membrane, congested fauces, enlargement of the lymph glands generally with blood effused into them, the stomach containing no food, but a collection of all sorts of substances, and, it may be, a black liquid like coffee dregs.

Three years ago, Negri[6+7] described bodies probably protozoal in nature, and which are always intra-cellular, that have been maintained to be constantly found in rabies in the pyramidal cells or nerve-corpuscles of the formation of the cornu Ammonis, and in the corpuscles of Purkinje of the cerebellum. In form and size they are very variable, ranging from less than $\frac{1}{2}$ to 25 micro-millimetres, the smallest being capable of traversing a Berkefeld filter. Whether they truly represent the parasite of the malady is contested, for it is questioned if they are always to be found however thorough the search, and they are either absent or very rarely found in the medulla, the chief seat of election of the virus. Again they seem to be found in fewer numbers, the severer the case, and fewer in rabies à virus fixe than rabies des rues. But if the presence of these bodies be established as pathognomonic of the disease-and the whole matter seems to to still sub judice - there would be a means of histological diagnosis capable of deciding the matter within 24 hours, though at present beyond the scope of most people in a position to undertake the biological test which I am pleading for as a comparatively simple/

simple and certain means of diagnosis.

The method of experimental inoculation adopted is to cut a piece the size of a small pea from the medulla in the region of the floor of the fourth ventricle and central canal which is then emulsified in 3 c.c. of the laboratory bouillon, or sterilised water, and two to three drops injected sub-durally. As I witnessed this simple operation at Saigon, the rabbit to be experimented upon was extended upon a board by cords slipped round its legs and passed through a hole at each corner of the board. A medial incision down to the skull was then made of about an inch in length, the tissues separated, and a hole sufficient to permit of the entrance of a hypodermic needle bored, with a guarded trephine, at a point ¼ inch behind a line joining the eyes, kept for the purpose. The needle is curved at the point to facilitate the injections into the sub-dural space. A couple of stitches, the application of some collodion, and the quick little operation is finished, the rabbit immediately afterwards conducting himself in his cage as if nothing out of the way had happened. Certain points must now be remembered. The rabbit may debelope septicaemia, when it will die about the third day without the muscular incoördination and paralysis characteristic of rabies, which disease never developes before the eleventh day. Or one may occasionally set up a tranmatic nerve degeneration that may sufficiently simulate rabies in its development. For these reasons two rabbits are always inoculated and, if there be doubt as to the result, a second series of four may be inoculated, i.e. two rabbits from each of the first pair inoculated.

If/

If the inoculation has been made from a dog which had developed the acute stage of the disease rabies will never appear before the 11th, and in the vast majority of cases between the 12th and 20th, day, the animal dying in 2 - 4 days more, though to meet the experience of certain rare cases 90 days is set down as the limit before one concludes the rabbit has not contracted rabies. The incubation may even extend to a period longer than this in a rabbit inoculated sub-durally from another animal, and it has happened that the rabbit has not developed the disease and died though inoculated from an animal certainly enraged. Thus we have a further reason for inoculating two rabbits; at one time instead of relying upon the results obtained from one. A description of the appearances of a rabbit affected with rabies I shall leave until discussing the proplylactic treatment of the rabic bite. Of practical interest is Keirle's statement that decomposition exerts little or no influence on rabic virus, that whereas cords in the early stage of decomposition will promptly kill, the same nerve matter when stinking rotten may often be used successfully in imparting rabies - Nicolle (7) also recommends that, if there be any doubt as to the freshness of the nerve matter, it may by keeping in glycerine for 48 hours previously, frequently yield successful results. Regarding police regulations, these of course are of the first importance and the vigilance of the police, especially of the Marine Police in an island so continually in communication with the mainland, is very necessary - There are insuperable difficulties in such a country in the way of a muzzling order being efficacious. But I think a dog/

dog tax and registration necessary, each dog wearing a collar with the name and address of its owner and its registration number, all dogs found without this means of identification to be shot. Were there no homeless pariahs the possibilities of the disease recurring would be much reduced. It would be well also to impress upon the people the necessity of reporting to the police the recurrence of any suspicious case. Six Months quarantine for all dogs brought into the country is necessary, for experience shows that though about 6 weeks is the usual period of incubation for dogs it may last six months or even eight. For this reason also it is necessary to keep isolated for 8 months, if it is not to be shot, any dog that has been bitten by another suffering from rabies. That all dogs belonging to ships should be tied up while in port is most essential, for such a dog becoming mad would, by the nature of the malady, probably wander from the ship before detected. This latter is strongly insisted upon in the British Board of Agriculture Reports, and Customs House and Dock Officials have strict injunctions - Coming now to the prophylactic treatment of the rabic bite undertaken to save the victim from a disease so terrible that no authentic case of recovery has yet been demonstrated - Statistics compiled by the Comite d'Hygiene, before Pasteur made his discovery, gives as the case mortality, including all bites cauterized, or non-cauterized, from dogs certified to be rabid, at 21% for bites on the legs, 30% for the arms and trunk, 67% for the hands, and 88% for bites on the face; while Brouardel collected evidence to show that the death-rate after efficient and early cauterisation amounted to 30% of the cases, and 80% where there was no cauterisation, or/

or it was unsufficient or tardy. It is evident that the protection of clothing which more or less wipes the poisonous saliva from the animals teeth must largely influence these statistics, apart from the nature of the tissues bitten. The immediate treatment of the bite is most advisable, if not to prevent the disease developing at least to prolong the incubation. Therefore in treating a bite which has just been inflicted, one would be inclined to encourage free bleeding, by the knife, and cupping if practicable, before proceeding to cauterize, best of all with the actual cautery, and a red hot iron may frequently be at hand when caustic may not be immediately available. If the wound be of such a nature as to render effective causterization impossible one must be content with antiseptic irrigation and the application of hot fomentations until the wound has healed. When should ~~a person~~ one insist upon a person resorting to a Pasteur Institute for treatment, I asked Dr Brau. In all cases when blood has been drawn was the expected reply, contusions beneath the clothes being ignored But every now and again a death from hydrophobia occurs when there is no more history than a trivial forgotten or unnoticed break in the skin, or a bite from a dog not recognised to be rabid, and the victim has never dreamed of the fate in store for him. But these cases are much the exception, while one the other hand cases are frequently met with of pseudo-hydrophobia more or less marked. Two instances I have met with of men by no means neurotic who, with a sense of constriction about the throat lived for many/

many weeks in a state of unhappy apprehension. Cases are frequently described of people in an neurotic condition mimicking the symptoms of the disease, in so far as they know them, especially pharyngeal spasm preventing deglutition, and a state of much mental terror is as one would expect a prominent feature. But no medical observer has stated that this condition is likely to be confounded with the disease, and in any case the fact that he is not dead within a few days should reassume the unhappy individual . On arriving at Saigon for treatment, which in accordance with Pastorian tradition is gratuitous to all men of all nations who may present themselves at the hour appointed, I required before receiving my first injection to make the necessary entries in a form provided to be filled in akl cases with the person's name, date of bite, site, nature, whether cauterized or not, and by whom the dog has been certified to be rabid. The treatment lasts for twenty one days in all cases , Dr Brau refusing to make it less. Beginning with a fourteen day old cord an injection is given twice daily for the first three days then daily for the rest of the time, each successive injection being made from a cord of a day fresher than the preceding. Having arrived at the two day old cord a start is ~~given~~ again made at the seven day cord, and ~~starting~~ from this point the series of cords of progressively increasing virulence is again twice inoculated, which brings the course to a conclusion on the 21st day, that is 25 injections in all. This treatment is supplemented in cases of severe bites about the head, the patient receiving three courses of the injections in IO days, each course finishing with the freshest cord used. The injections are made into the subcutaneous tissue of the abdomen and the same dose is given to the child as to the adult.

Untoward/

Untoward results from the treatment have in one or two cases been reported in the journals of late years,(2) cases where paralytic symptoms have occured, but always ending in cure, and regarding the nature of which opinions are at variance. Of still more rare report is a scarlatiniform eruption spreading from the point of puncture. The treatment may also determine a malarial attack after many years freedom which, from one's knowledge of the ways of malaria, does not surprise one. Also, during or after, a state of neurasthenia or hysteria, it may be "l' hysterie rabi forme," may occur which however is more likely to be from the bite and the fear of its consequences than from the treatment. I saw an old man at Saigon who was in a poor state of health, for his face had been badly mangled by the brute that had bitten him, improved marvellously in his general condition during the treatment, only to be seized with hysteria on the last day of his treatment. I fancy ~~more by the fear brought about~~ brought about more by the fear engendered at leaving the Institute than anything else. Dr Braw however, was emphatic about the harmlessness of the treatment. Locally a slightly painful reddened induration at the most occurs, disappearing readily on fomenting and not likely to occur in those who take a hot bath daily. As far as I could tell the treatment had no obvious effect of any sort, and did not prevent one from enjoying active exercise and perfect health throughout the course. The only instruction one receives is to live as ordinary and not pre-occupy one's mind with the subject of rabies - Whether free alcoholic indulgence or a low/

a low state of health is prejudicial to the success of the treatment may well be doubted, but it seems a state of nervous anxiety may at least hasten the period of incubation - A French Officer and his wife, both having received bites on the hand of much the same severity from a rabid dog, arrived at the Saigon Institute for treatment. The husband took to the free indulgence of alcohol through-out the course of treatment, so much so as to have his wife in a continual state of anxious worry regarding him - She developed hydrophobia and died, he escaped - This is the only case of failure recorded in the last four years at Saigon - The advent of some other illness during the treatment is by no means a reason for stopping the series of injections, but rather an urgent argument for their continuance as usual - Pasteur (1) showed that the virus taken from a rabid dog the "virus des rues" is exalted in virulence by successive inoculation from rabbit to rabbit, until by the 80th or 100th passage the period of incubation is lowered to seven days, and by the 150th passage the virulence becomes permanently fixed, giving a constant invariable period of six completed days. But this laboratory virus known as the "virus fixe" becomes attenuated somewhat in hot climates, so that the period of incubation is lengthened. Thus at Saigon where the laboratory virus comes from the original"virus fixe" of Paris the period of incubation in the rabbit after subdural inoculation is 8 days - I have already described the procedure of sub-dural inoculation as I saw it at Saigon, two rabbits being always inoculated at the one time - They are then placed in a cage which is labelled with the date - In my daily visit to the rabbit room, I found the rabbits always in good health for 8 days after inoculation. But the following day one noticed his food was untouched and he was not easily disturbed when, however, a

dragging of the hind legs was noticeable. On the following day one finds him stretched out with his head thrown back on his spine, and were it not for the gentle rise and fall of the abdomen, one might at first glance think him to be dead. But for two days more he lives in this seemingly lifeless condition, death taking place on the 12th or 13th day. Furious rabies is described as a rare occurence in the rabbit, most likely if it does occur to follow inoculation from another animal. Quickly after ~~the~~ death the operator, a laboratory assistant, working with the sure dexterity of long practice and with every aseptic precaution, exposes the central nervous system, the vertebrel lamine being cut through by scissors, ~~and every care taken~~ every care being taken to preserve the membranes intact and thus the nerve matter against germ invasion - The medulla is retained for the inoculation of two fresh rabbits and two portions of the cord, 3 inches each in length, ~~and~~ are each suspended by a thread in a sterilized bottle containing caustic potash, and having two openings plugged with cotton wool, as one preserves from contamination culture media in test tubes. Thus the cord is exposed to dry filtered air, turning brown as it dessicates. When required a millimetre to each person is snipped off and triturated with a glass rod in a conical glass and them mixed with bouildon in the proportion of 3 c.c. to each millimetre. The glasses for mixing, and the filter paper caps are of course all previously sterilized in the hot air chamber; and the glass rod, forceps, and scissors sterilized by the spirit lamp between each ~~operation~~ preparation. Also the needle of the sterilized hypodermic syringe is passed through the flame between the injection of each patient, and is filled by piercing through the paper cap protecting the contents of each glass - Each glass/

glass is labelled with the strength of the cord prepared, and patients are taken in routine according to the strength of cord in the series at which they are due, progressing, to prevent accidents and allow of the same syringe being used, from the less to the more virulent injections - The skin is washed with anti-septic, and for a second after the injection a pad of cotton wool soaked in the antiseptic is applied to the puncture - At Saigon the number of cases treated does not necessitate the daily inoculation of rabbits, portions of cord, according to the days of dessication that may be required, being reserved in glycerine for the future use - Other (4) methods of treating the cord are also used. Puscariu obtains the same results by heat as the Pastorian method does by dessication, and Högyes employs the method of dilution of the fresh cord to corresponding strengths - The latter I understand is the method employed at the Pasteur Institute of India, and is the most applicable method when it is necessary to send the virus to long distances - The fact that the same result can be obtained by dilution proves, that in dessication of the cord the virus is not attenuated but diminished in amount. The resuls of the treatment differ but little in the Institutes throughout the world, the latest statistics (2) giving the death rate from .18% at Lyons to 1.24% at Vienna. These figures speak for themselves, testifying to a remarkable achievement in the field of preventive medicine, brought about by the genius of Pasteur. But they only include the cases where death has supervened 15 days after the treatment, deaths occuring before this, being considered due to the severity of the virus, the gravity of the bites, or from delay in going to the Institute for treatment - It is not unusual for people bitten/

bitten on the face to be arriving in the 3rd week - It is said that in Spain all persons who arrive for treatment after the 10th day are refused with implacable firmness.(2) Here lies the one weak point in the Pasteur treatment. The disease may out-run the remedy, even when treatment is undertaken immediately, and the case end as disastrously as if it had not been treated at all. Severe multiple bites of parts rich in nerves and lymphatics, close to the spinal origin of the nerves, are proved to be the most dangerous. This points to the fact that the virus does not, as a rule, reach the central nervous system immediately, that there is a period of delay or passage, depending upon the part bitten, before what Gamaleia calls the period of incubation in the central nervous system. Pasteur(1) showed, however, that intravenous injection of an ear was, as one would expect, inevitably followed by rabies; in spite of immediately cutting it off with the thermocautery between the point of inoculation and the head. Keirle(4) records that eight boys were bitten by the same dog, and four died. All bitten on the bare face and neck died, the others escaping, and all were under treatment within three days of having been bitten. For the completion of immunization fifteen days after the termination of treatment are required. Therefore, he concludes, that all cases which develope the disease in 35 days are not amenable to treatment, which is useless when the disease has declared itself. He quotes the statistics of Bollinger, compiled before the days of the Pasteur system of inoculation, that the stage of incubation in 6% is between 3 and 18 days and in 60% between 18 and/

and 64 days. That these boys died from hydrophobia contracted from the dog, and not from the treatment, is easily proved by experimental inoculation, the incubative stage of street virus being about fifteen days, never less than eleven, while that of the laboratory fixed virus is seven.

Could the same reliable results be safely assured, an antirabic serum would, by simplifying the treatment, replace the Pasteur system. This however has not been attained.

Needless to say radium (2) has here also been on trial. Tizzoni and Bongiovanni have lately been proving that the virus in vitro is rendered completely inoffensive by the emanations of radium; and also, that animals which had been inoculated with virus fixe, even sub-durally, are saved by treatment for one hour daily for eight days, the rays being directed on the eye.

So satisfied are they with the results that they propose to risk the experiment upon man.

I ought to have mentioned, that to be bitten by a person suffering from hydrophobia, is only an accidental possibility in the late paroxysmal manifestations of the disease. In Penang a priest told me that while carrying out the duties of his calling at the side of a Chinaman, supposed to be dying from the disease, he was afraid he might have been inoculated from the froth of the victim's mouth through a small wound he showed me on his finger. He was much disturbed about the possibility, and I could not but advise him to go away for treatment.

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