directed attention to these parts, because, as in the case of nasal infections provocative of the disease, it is not necessary to have them. A chronic rhinitis with pocketing of the secretions in which the toxins become generated is not necessarily so troublesome as to make the patient think much about it, and so, even with no symptomatic indications, organisms may and do produce toxins in the utero-vaginal passages which are certainly related to the disease. Through the kindness of Dr. Moore Alexander, a considerable number of swabs have now been examined in rheumatoid cases, and the *B. coli* has been found, and the examination of a large number of controls has proved that it is not present normally. In one or two instances staphylococci have been found (a recent case presented a large number of these organisms), but this organism is associated with osteo-arthritis rather than the rheumatoid form.

Now in treating these cases it is obvious that several distinct lines have to be followed. In the first place, the local condition must be attended to by systematic douching and cleansing. Secondly, steps must be taken to favour the elimination of poisons already in the blood; and, thirdly, the local joint trouble must be treated.

In connexion with the second of these essentials one must again refer to an observation which I made a good many years ago, and which is now becoming recognized pretty generally concerning the perverted thyroid secretion which is so often present. Quite a number of the patients get enlarged thyroids, and it is noteworthy that the glands sometimes diminish in size when thyroid substance is given moderately, and that the general symptoms of the disease improve under this remedy. I take it that the enlargement of the gland in these cases is a result of its endeavour, by drawing more blood through itself, so to speak, to supply the tissues with the normal secretion which it fails to produce, and that the giving of thyroid reduces the necessity for its attempts in this direction. There is no doubt that in many cases thyroid extract is of great value, especially in those cases where the patients tend to put on flesh and have no tachycardia. It must be borne in mind that Raynaud-like symptoms and cramps in the extremities are themselves symptoms of athyroidia. Regarding other drugs, I have found most benefit from quinine salicylate with salol. Where the colon bacillus infection is derived from a chronic colitis, in a way presently to be described, one of the most effective remedies is ox gall, given in 10 to 15 grain doses (in cachet) several times daily.

But now about the joints. I have explained how they become fixed by fibrous adhesions and by fibroid thickenings of the synovial and periarticular tissues, and I have not the slightest doubt that fibrolysin is a most valuable remedy which helps to release them and render them flexible, and another most useful application is the oleate of mercury (10 per cent. in oleic acid), having hydrochloride of morphine mixed into it in the proportion of $\frac{1}{2}$ grain to the drachm. I have had a number of cases of rheumatoid diseases in girls and children who have been treated on the lines which I have indicated—cases which have been crippled and bedridden for years, but which have become quite well, and able to take their places as workers and as useful members of society.

There is just one other class of cases to refer to here, namely, those in which a chronic colitis is the local seat of absorption. Recently I had under my care a very intractable case in a girl who had been bedridden for years. Her joints were flexed and fixed, and were progressively getting worse. She had no pathogenic organisms in her genito-urinary mucous tract, but she had a troublesome colitis. After getting her considerably improved in the hospital I sent her to the Mineral Water Hospital in Bath, where Dr. Preston King kindly carried out the Plombières line of treatment (which consists in irrigation of the colon), with the result that she came back able to use her arms and hands freely and to walk fairly well, although unfortunately her feet and ankles have remained rather stiff and painful. I believe that Still's disease in children, which is a rheumatoid disease associated with large spleen and lymphatic glands, is only another variety of the toxic class, and that, sooner or later, the source of infection will be discovered and become capable of being treated. It is possible that it follows upon one of

the mysterious colon bacillus infections which we meet with from time to time in young children, the origin of which is not yet fully understood. Chronic rheumatoid arthritis, as I have said, often follows upon an acute attack, for a description of which I must refer you to my paper in the Royal Southern Hospital Reports for 1902, and to a post-graduate lecture published in the *Lancet* of 1904. It is nearly always regarded as having been a prolonged case of rheumatic fever, and this has given rise to the impression that the disease under consideration is a rheumatic one. It is best to call the antecedent acute disease rheumatoid fever, and its later stage rheumatoid arthritis.

One word about osteo-arthritis, and I have finished. I merely name it in order to differentiate it from the diseases of which we have been speaking. This is the disease in which the cartilage undergoes hyperplasia, then disappears, leaving the eburnated bony surfaces in contact, and in which overgrowth takes place in the bones, giving rise to outgrowths. With rare exception, this disease begins during or after middle life, and a variety of it constitutes the arthritis of advanced age. It certainly occurs in young people, but much more rarely than the rheumatoid arthritis, and I have seen three cases in children, one of them quite recently. An x-ray plate of his hands demonstrated that cartilaginous destruction has taken place. The deformities are more marked in this disease than in the other, owing to the bony outgrowths, and it is in this disease alone that surgical interference is warranted.

CATS AS PLAGUE PREVENTERS.

BY

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I.M.S., M.A., M.D.

It is now about three years and a half since I first endeavoured to show that the best way to prevent plague in India is by keeping cats, and although considerable progress has been made, and many people have now come to realize the advantage of keeping cats, there are still some who hesitate to give the keeping of cats first place in the list of preventive measures. I should like now to reply to some of the objections that have been made regarding the cat; secondly, to consider some of the circumstances which have tended to retard the proper appreciation of the cat; and thirdly, to give some additional evidence in favour of the cat, and particularly to draw attention to the very valuable evidence from Professor Koch, who for some years, quite independently, advocated the employment of cats for preventing plague, and also to the evidence which Dr. Gimlette has supplied from Malay.

OBJECTIONS TO THE CAT.

It has been stated that the Indian cat is not a sufficiently good rat killer to justify the expectation that cats will prevent plague, and here I must admit that there are many ways in which the activities of the cat can be defeated. For example, a lady informed me that although there were two or three cats in her compound (the enclosure in which the bungalow and outhouses stand) still there were several rats. It was found that about fifty old packing cases were stored in one outhouse, and as most of these packing cases contained old books, papers, straw, or rubbish, the rats had made holes in many of them, and so were able to escape from the cats. When these boxes were cleared out and the rubbish was burned we heard no more about rats in that place. Occasionally we found that a person who had a cat in his own house would complain that rats were frequently coming in, but on making inquiries it would be found that there were many servants' houses in which rats were abundant because there were no cats in them. It is particularly desirable that the servants should be made to keep cats. Early last year I made the following experiment: Eight cats and seventeen rats were let loose in a room with glass doors, so that we were able to watch the result. In a few minutes all the rats were killed; one small cat ended up with four dead rats in its mouth, another had three, and another had two. The cats were ordinary

village cats, and had not been specially selected. The editor of the *Indian Medical Gazette* was among those who at first doubted whether plague could be prevented by cats, but after hearing the subject fully discussed at the Bombay Medical Congress he wrote as follows:

"Conversation with many men after the meeting convinced us that very many were coming round to Colonel A. Buchanan's views that the cat is the natural enemy of the plague rat, and that it is one of the measures of plague prevention dictated by their Scriptures to Mohammedans and Hindus alike, and which will therefore be acceptable to all. We certainly agree that more attention should be paid to this simple method of prevention."

It is essential that a reasonable chance should be given to the cat. Where there are grain stores and mud walls more cats are required; where there is little food for rats and the walls are built with stone and lime a smaller number of cats will suffice.

IS PLAGUE INFECTIOUS?

One writer has attempted to show that plague pneumonia is common, and that this form of plague is directly infectious from person to person. If that view is correct, then rat destruction can only be partially successful, and the employment of cats would not necessarily check the disease. In order to prove that plague pneumonia is infectious directly from person to person it would be necessary to exclude the possibility of infection having taken place in the house in which the first case occurred, or by a flea which may have been concealed in the clothes of the person who was suffering from pneumonic plague. If plague pneumonia is common, and if pneumonic cases are directly infective, we should expect to find epidemics among the attendants in a plague camp, but Browning Smith a few years ago drew attention to the prevalent opinion that one of the safest places during a plague epidemic is a plague camp, and that has been the experience of most medical men in India. Now we do occasionally hear of a nurse who has been attending on a plague patient getting an attack of plague, and Dr. Gimlette reports from Malay the case of a patient who was in hospital for rheumatism, volunteering to attend on a plague patient who had been brought to the hospital, and getting an attack of plague. But such cases can be explained on the supposition that a rat-flea had been concealed in the clothes of the first case. If the infection were conveyed direct we should expect to hear of a second, third, and fourth cases, but such an instance has not come to my notice. Ten years ago I accepted as a working theory—it was before the rat-flea theory had been proved—that plague pneumonia is directly infectious, but when a pneumonic case has been admitted to a plague hospital, or accidentally to the wards of a general hospital, I have always been agreeably surprised to find that no cases occurred among the hospital attendants. I do not say that direct infection never occurs, but I have never been able to find any clear and definite proof that it does occur. The point is one of great practical importance for many reasons, but all that we need concern ourselves with at present is that the commonly accepted view, that plague is mainly due to rats, is not upset by the statements of the writer referred to.

IS PLAGUE DYING OUT?

One reason why there has been so much delay in appreciating the value of the cat is the idea which is prevalent in many parts that plague is dying out; and the recent events in Nagpur may be referred to by way of illustration. The population of the city is about 120,000. In the years 1903-4 there was a severe epidemic with a mortality of 14,374. In 1906 there was a mortality of 5,165, and after that for a period of three years there was an absence of severe epidemics. Rat-catching was carried out for some time with considerable vigour, and frequently about 500 rats were caught in one day. A census of cats taken last year showed that the percentage of tamed cats to houses was only four—that is, one to twenty-five houses. The annual report of the municipality, which was issued about July, 1909, contained the words, "plague, like all epidemics, appears to have exhausted itself." A scheme for the introduction of kittens had been started, but it was too late. In August and September plague spread rapidly through the city and

the mortality rose to the unprecedentedly high figure of 205 in one day, and 3,900 in one month. When, then, we see it stated that plague is dying out it would be advisable to inquire on what basis this opinion is founded. Rat destruction by traps and poison may succeed for a time, but the only permanent way to keep the numbers down in India, where there are, and for many centuries likely to be, so many houses with mud-built walls, is by the employment of cats. If the number of cats is sufficiently increased we can say for certain that plague is dying out. But plague might die out from one of two causes—one by a diminution in the number of rats, and the other by a diminution in the virulence of the plague germ. If the plague germ is less virulent we should expect to find the intensity of the symptoms less, but there was certainly not any diminution in the intensity of the symptoms, for it was the general opinion among the medical men in Nagpur that they had never seen, especially in the earlier days of the epidemic, so many cases die before there was time for the buboes to appear.

CATS VERSUS INOCULATION.

Probably nothing has more retarded progress in the acceptance of the cat theory in India than inoculation. It is now generally admitted that inoculation with Haffkine's serum is a good thing. During the fifteen months prior to my departure from India, I inoculated close on 10,000 persons, and I could give many illustrations to show the great advantage of inoculation. In Amraoti all the policemen were inoculated except one man, and that man was the only policeman who died. The forest officer's servant Kishen, Kishen's wife, and their two children lived in the same house. Kishen and his wife were not inoculated, and both died; the children were inoculated, and neither took plague. In Nagpur all the city police, a force of about 190, were inoculated except two men, and these two were the only men in the force who died from plague. In the Empress Mills, where over 5,000 hands are employed, we inoculated nearly all the workpeople. Among the uninoculated 90 died, whereas among the inoculated only 7 died, and most of these 7 were inoculated in the incubation period. Here are the results in eight houses in which some of the workpeople lived: There were 63 persons; cases occurred in each of the eight houses; of 36 persons who were inoculated, none died, while of the remaining 27 only 4 escaped. I could give many similar instances to show the great value of inoculation, and I fancy there are few men who have better reason for appreciating the greatness of Haffkine's discovery than I have, but I think it is better to try and prevent plague by getting rid of rats. A fire engine is good for preventing a conflagration, but it is better to prevent the risk of a conflagration by getting rid of the inflammable materials. Haffkine himself is a strong advocate of rat destruction, and I had recently* an opportunity of discussing the subject at Berlin with Professor Koch, who said: "You cannot stop plague by inoculation of man, for plague is a disease of rats, and if you want to get rid of plague you must attack the rat." There are some who seem to think that we should rely mainly on inoculation, but my view is that if in the intervals between epidemics efforts are made to instruct the people in regard to the necessity for keeping cats, and if facilities are afforded for the distribution of cats, the necessity for inoculation would rapidly diminish. Prevention is better than cure, and distal prevention by rat destruction is better than proximal prevention by inoculation. I have inoculated as many as 523 persons in one day, and it is perhaps only when one has done large numbers of inoculations that we begin to realize fully what a difficult task it would be to inoculate the enormous population of India—not once or twice, but every year when an epidemic comes. The Hon. W. Chitnavis, Chairman of the Nagpur Municipality, and also member of the Viceroy's Council, in a letter written last month, says that "the Nagpur people have come to realize the truth of your teaching, and I am sure they have even now showed ready keenness to possess cats. I know every time there is 'a breeding' of cats in my house I find that somebody steals them away. That in itself is a proof that cats are not despised, but that there is a demand for them."

* This letter was written prior to the late Professor Koch's fatal illness.

RAT DESTRUCTION BY TRAPS AND POISON.

Another thing which has tended to retard the due appreciation of the cat is the comparative success which has attended the efforts to remove rats by traps and poison. There are, however, many Hindus who object very strongly to the use of traps and poison, but even in the European quarter in Nagpur, where no such objection was met, it was found that, although rats could be cleared out by traps and poison, within a few weeks other rats would come in. It was only in those houses in which cats were kept that the rats could be kept permanently away. When plague began to spread in Nagpur we started what may be called the rat-hole inspection scheme. A number of inspectors were employed to go to each house, thoroughly inspect every nook and corner of the bungalows, and especially of the servants' houses, and to lay poison at the rat holes. After a few days the rat holes would be closed up, and if new holes were found poison would be laid again. As an emergency scheme this was very successful, but it is expensive.

PROFESSOR KOCH'S VIEWS.

Professor Koch has been for some years recommending the employment of cats for preventing plague, and in accordance with his suggestion the use of the cat is now being advocated by Kitasato in Japan. In the Public Health Reports of Japan (September, 1908), Kitasato gives a summary of Koch's views, and the following is an abbreviated extract from his report:

"The use of artificial methods like mechanical devices and poisonous drugs must prove laborious, expensive and at the same time comparatively inefficient; the limited powers of man are far inferior to the boundless resources of Nature. Examples: The *lantana*, a plant with pretty flowers, was introduced into the Hawaiian Islands, and after a few years caused great damage to agriculture. A small species of fly (*Agromyza*), which deposits its eggs within the seeds of the *lantana*, was introduced from Mexico, and in a few years the *lantana* showed signs of diminution. Second example: The sugar cane pest, a species of leaf hopper, in the Hawaiian Islands caused a loss amounting to several million dollars; an ant-like animal parasitic within the egg mass of the leaf hopper was introduced in 1904 and the sugar-cane pest was checked. Koch had experimented with the ichneumon of Egypt, the mongoose of India, and the common European ferret, but he found the cat most fitted for the task. The most useful things are often to be found among the most commonplace. An outline is given of a scheme for encouraging the keeping of cats, and attention is drawn to the necessity for providing holes, large enough to admit cats into rooms in which rats are likely to be found."

Professor Koch came to the conclusion that the cat is the best plague preventer in Africa, and his conclusion, taken with the fact that there is such a strong religious feeling, both among Mohammedans and Hindus, in favour of keeping cats, must surely strengthen very considerably the grounds for holding the view that the cat is the best plague preventer in India.

CATS IN MALAY PENINSULA.

Dr. Gimlette, in the *Journal of Hygiene* (April, 1909), refers to the fact that there has been very little plague in further India, and states that on this account considerable interest attaches to the small outbreaks which occur from time to time. "The keeping of cats," he says, "is a national convention which is common to other Mohammedan people, but in Malay the influence of folklore has an additional significance. The ancient superstitious faith of the Malays before their conversion to Mohammedanism seems to survive in the everyday treatment of their cats. In 1907 plague broke out among a gang of imported Javanese coolies who had been working on the Duff Development Concession. There happened to be no cats on the company's rubber estate, a fact which is interesting as giving negative support to Colonel Buchanan's hypothesis."

CATS IN OTHER COUNTRIES.

It would be interesting to know how far the failure of plague to get a hold in other countries could be accounted for by the presence of cats. Kitasato had a census of cats taken in various parts of Japan, and found that the percentage of cats to houses varied from 4 in Tokio to 49 in

the Yamanashi district, where cats are kept specially to protect the silk industry from rats. Now in Tokio, after 4½ million rats had been destroyed, it was found that rats were still numerous. At the Bombay Congress Professor Shiga informed me that plague could never get a hold at Yamanashi. I think, then, that inquiries conducted on these lines would afford valuable evidence as to why one country or part of a country should escape, while another suffers from repeated epidemics of plague. Since plague began, the medical inspection of ships coming from India is gradually developing into a sort of tyranny, and the sooner people come to realize that a good supply of cats at the port towns and a few cats on ships are all that is required for preventing the spread of plague at seaports, the sooner will the discomfort which arises from the present system of inspection be abolished.

CONCLUSION.

Some time ago I ventured to predict that "a few years hence we shall look on the neglect of the cat as one of the most extraordinary things in the whole history of our inquiries into plague and its prevention," and already there are indications that this prophecy is beginning to come true, for we frequently hear people saying something like this: "If plague is a disease of rats, it is only plain common sense to check it by keeping cats." There are, however, still many parts of India where the value of the cat is not fully understood, and there is a tendency among some to think that plague is dying out. One of two courses is now open—one to trust to luck and to soothe our minds with the idea that plague is dying out; the other to leave nothing to chance, but to endeavour by every means to reduce the number of rats, and to impress on the people that of all the methods that have been employed for killing rats, and for keeping them away, there is none that can be compared with the rat-destroyer which has been provided by Nature—namely, the cat.

VICIOUS CIRCLES ASSOCIATED WITH DISORDERS OF THE URINARY ORGANS.

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AMONGST the complications of disease with which the physician is called upon to deal, vicious circles play an important part. Chronic disease becomes more chronic in the presence of this complication, and acute disease more acute; while the territory over which morbid processes play havoc is apt to be indefinitely enlarged. Indeed, it is not too much to say that a lethal exitus is frequently accelerated by, if not wholly due to, the reciprocally acting factors that have been called into action.

Although vicious circles are of such consequence in determining the duration as well as the issue of an illness, they have almost wholly escaped attention. No lexicographer appears to have defined what is meant by a "vicious circle" in medicine, and yet the complication meets us at every turn, and has to be taken into account in prognosis as well as in treatment.

Among the great systems of the body, the urinary system is of special interest, owing to the number and variety of circles met with. Illustrations of the mechanical, neurotic, chemical, organic, and symptomatic forms may be found in abundance, many of them possessing great importance.

The following topographical classification will be found convenient, although it cannot always be strictly adhered to:

- I. Circles associated with the bladder and prostate.
- II. Circles associated with the kidneys.
- III. Circles associated with the ureters and urethra.

I.—Circles Associated with the Bladder and Prostate.

A striking example is presented by retention of urine caused by prostatic hypertrophy. The venous plexuses surrounding the prostate are always of ample size and undergo further dilatation in elderly men. This explains how it is that when, from some cause or other, congestion