had for two years. Both told me the parts felt quite numb when I last saw them.

In conclusion, I wish to thank Drs. Sandford Smith and Milton, who kindly gave the anaesthetics, also the Matron (Miss Fry) and the nursing staff, for their able assistance at the time and in after-treatment, which is most important.

THE USE OF ADRENALIN IN ACUTE ASTHMA.

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In the *BRITISH MEDICAL JOURNAL*, October 1909, I wrote, in answer to a query by a correspondent, giving shortly my experience of the uses of adrenalin in asthma. Since that date I have had further opportunities for observing the effects of this treatment, and I now feel justified in writing a short account embodying the results I have obtained.

In October, 1907, my attention was first directed to the possible value of adrenalin in acute asthma by the relief quickly afforded by cocaine in this condition; and arguing from the similarity of effect produced by the application of adrenalin solution and that of cocaine on the nasal mucous membrane, I decided to give adrenalin a trial in a very acute case which I then had under treatment.

CASE I.

A young man, aged 23, had been suffering from asthma for several years, and had been in the habit of cutting short the attacks by the use of a preparation containing cocaine, which never failed to afford him instant, though temporary, relief.

On examination I found the heart very much weakened by the repeated attacks, and there was a considerable degree of dilatation; the slightest exertion brought on palpitation and shortness of breath, and he could only with the greatest difficulty get upstairs.

Considering the further use of the preparation to be contra-indicated by the relatively large amount of cocaine contained, I ordered him, during his first acute attack after coming under my care, to spray into the nose a solution of adrenalin chloride, 1 in 2,000. Within ten minutes of the first application of the adrenalin he was completely eased, and remained so for the remainder of the day. Subsequently, during each attack, he used the spray with complete success. If the attack threatened to be exceptionally severe the solution used was of the strength of 1 in 1,000, or if milder, 1 in 4,000 was sufficient. The patient quickly learnt by experience what strength would be needed, and when I last saw him he informed me that he was carrying about with him a bottle of adrenalin solution, 1 in 1,000, in case of further attacks.

CASE II.

Shortly after this I was called to a lady, aged 48, who was in the throes of a very acute attack. I had taken with me a bottle of adrenalin solution and a small spray, and promptly applied the adrenalin in the strength of 1 in 1,000, with the result that the attack, which had been continuous for several hours, was at an end in ten minutes; in a few more minutes the patient was sleeping comfortably. Subsequently this patient informed me that she had on several occasions repeated the spray, and in each case the results had been equally satisfactory.

From that time until the present I have used the adrenalin solution in every case of acute asthma which has come under my care; and in every case, now 13 in all, the results have been immediate relief, lasting for longer or shorter periods. In none of these patients have I observed any undesirable after-effects.

The last two patients on whom I have used the solution have had to continue the treatment at shorter intervals than in any previous instance.

CASE III.

Miss M., aged 21, had suffered from acute asthmatic attacks for fifteen years. The attacks came on nightly, lasting four or five hours, but every fourteen days the attack was of much greater severity and continued for twenty-four hours or longer. The heart was dilated and feeble, and when I first saw her she was very ill. The attack had then lasted from 1 a.m. until 4 p.m., but within five minutes of spraying the nose with a solution of 1 in 2,000 she was much more comfortable, and within fifteen minutes the attack had absolutely passed off.

Subsequently this patient had attacks nightly, which regularly woke her between 1 a.m. and 2 a.m. Dieting and the

usual remedies produced no effect, and she used to have within reach a spray ready charged with 1 in 2,000 adrenalin solution, with which she cut short each attack at its commencement and was assured of a good night's sleep. After some weeks the attacks, which had been becoming gradually less severe, ceased entirely.

CASE IV.

Mrs. H., aged 55, a highly-strung gouty and neurasthenic patient, had suffered for years from repeated attacks of acute asthma. She could not take belladonna, and no other drug seemed to produce any effect on the condition, though she obtained some relief from burning ozone papers. Unfortunately the effort of sitting up in bed and lighting the paper made the attack much more severe.

After a very acute attack, during which I used the spray with instant relief, this patient has always slept with a small nebulizer ready charged with the solution. When roused by an attack she immediately uses the spray, and after a few minutes is able to sleep again. She is frequently roused in damp weather three times during the night, but in spite of the frequent use of the adrenalin solution I have observed no ill effects therefrom.

I have never used the spray in any other form of asthma but that which I should call acute spasmodic asthma, but my friend, Dr. W. B. Russell, to whom I mentioned the treatment, informs me that he has employed it in the case of an elderly gentleman in whom the attack was undoubtedly uraemic in origin. In this case also complete, though only temporary, relief resulted.

As to the mode of action of adrenalin in these cases, I must confess that I have so far not arrived at any conclusion. My first two patients both showed some degree of hypertrophic rhinitis, and I was inclined to think that the temporary relief of the local engorgement of the nasal mucous membrane might have caused the sudden termination of the attack by doing away with a source of peripheral irritation. None, however, of my later patients have shown any signs of nasal trouble, so that this theory has had to be abandoned.

In a condition of this sort suggestion undoubtedly plays a considerable part, and I formed the opinion that in a certain number of the cases this might account for the results obtained. This was more especially my view with regard to the last patient, but on one occasion when she complained of pain and irritation arising from haemorrhoids I gave her some adrenalin suppositories; it had escaped my memory that she was in the habit of using adrenalin for her asthma, but at my next visit she informed me that she inserted the first suppository during a mild attack of asthma, and to her surprise not only was the rectal irritation removed, but the asthma abruptly terminated. As the patient had no idea of the nature of the suppository, and as she frequently suffers from rectal irritation without any traces of asthma, there seems to me to be little doubt that in this instance adrenalin absorbed by the rectal mucous membrane acted in the same manner as when absorbed by the nasal mucosa.

In the *Medical Review*, June, 1909, there appear extracts from an article by N. V. Jagic embodying the results obtained by the subcutaneous injection of adrenalin solution in acute asthma, as practised also in America. He suggests that adrenalin may act by causing a temporary depression of the vagus, whilst stimulating at the same time the sympathetic nervous system. The results obtained by Jagic seem to be very similar to those which I have observed from the nasal spray; and considering the dislike that most patients not unnaturally have for subcutaneous medication, I think the method I employ is less likely to be resented.

At the meeting of the Zoological Society of London on February 1st, the Secretary read a letter from Captain J. A. M. Vipan, F.Z.S., which suggested that the probable cause of the immense numbers of the freshwater Cyprinodont fishes known as "Millions" (*Girardinus poeciloides*) in Barbados, and their consequent agency in suppressing malaria by destroying mosquito larvae, was the absence of other freshwater fishes in that island. The writer added that in his opinion there was no specific distinction between *G. poeciloides* and *G. guppi* of Trinidad, and that *Poecilia reticulata* (Peters), of Venezuela, was the same fish. The presence of other freshwater fishes in these localities prevented extensive multiplication of these small fishes, with the result that they had no effective action in keeping down mosquitos.