bases of the tumours. The patient was kept in a pleasantly shaded chamber for about eight weeks, and restricted to a vegetable diet. One or two drops of a solution of ten grains of nitrate of silver in one ounce of water was daily applied to each eye. At the termination of the period just named, the sight of both eyes was perfect. The opacity in the right eye is scarcely perceptible, and in the left is only visible when the eye is turned upwards. The lids have resumed their normal position.

In February last Miss H. was in excellent health, and most happy in acquiring an education.

ART. VII.—*An Examination of the Testimony relative to the Efficacy of the Hydrated Peroxide of Iron as an Antidote to Arsenic, with Directions for its Preparation and Exhibition.* By T. ROMEYN BECK, M. D.

IT is now about six years since the use of the peroxide of iron was introduced to the notice of the public. It has been made the subject of numerous, and for the most part satisfactory, experiments on animals; it has been frequently exhibited to persons poisoned with arsenic, and in many instances with success; it is also a substance very easily prepared, and one that can always be kept on hand either by the physician or druggist.

These circumstances might be supposed sufficient to establish firmly the character of any antidote, and I do not doubt but that it is thus viewed by those who have from time to time noticed the testimony adduced in its favour. But this has, in many instances, consisted of brief notices of successful cases or experiments, scattered through the selections and summaries of Medical Journals, and hence has possibly not made that impression which a collection of the whole would produce. With a view to promote that desirable object, and at the same time to urge an early exhibition of this substance in all cases of poisoning by arsenic, I have ventured to prepare the following observations. I propose to follow the following order. 1. A notice of the discovery. 2. The results of experiments on animals. 3. The efficacy of its exhibition on man. 4. The mode of its preparation and exhibition.

I. The earliest notice that I have seen of the efficacy of peroxide of iron as an antidote, is contained in a letter addressed to M. Poggendorf, the editor of a German Scientific Journal by Dr. Bunsen, bearing date Gottingen, May 1, 1834.* In the same year Drs. Bunsen and Berthold jointly addressed a communication on the same subject to the Academy of Sciences at Paris.† It had been previously established by the experiments of Renault and others,

* London and Edinburgh Philosophical Magazine, vol. vi, p. 237.

† Lancet, Oct. 18th, 1834, and American Journal Med. Sci., Feb. 1835, p. 537.

that the native arsenite of iron (mispickel) is nearly innocuous to animals, and on this fact, the investigations of Drs. Bunsen and Berthold seem to have been founded. They also ascertained that "a solution of arsenious acid is so completely precipitated by pure hydrate of iron recently precipitated and suspended in water, that a current of sulphurated hydrogen gas passed into the liquor after filtration, and the addition of a small quantity of muriatic acid, does not indicate the presence of the smallest quantity of arsenious acid." Again, if a few drops of ammonia be added to the peroxide, and it be digested in a gentle heat, with arsenious acid, reduced to fine powder, a sub-perarsenite of iron is formed, which is perfectly insoluble. Encouraged by these results, they proceeded to perform

II. *Experiments on Animals.* From four to eight grains of arsenic were given to two young dogs, and the œsophagus was tied to prevent vomiting, and the peroxide was then exhibited. They lived more than a week without manifesting any of the symptoms of poisoning. A quantity equal to four or six drachms of the peroxide was deemed sufficient to transform in the stomach eight or ten grains of arsenious acid into insoluble arsenite. As however the hydrated oxide is innocuous, they advise its use in much larger quantity. Rabbits also which are destroyed by very small doses of arsenic, were saved by the antidote.

Orfila and Le Sueur repeated these experiments on animals, and generally with favourable results. They found, however, that if the administration of the antidote was delayed beyond half an hour, all the symptoms of poisoning occurred, and death was the termination.* M. Bouley, Jun., of Alfort made an elaborate series of experiments on horses, and which were published in 1835. He ascertained, in the first place, that the peroxide was totally inefficacious in poisoning by arseniate of potash, (Fowler's solution,) and for a manifest reason—the iron cannot overcome the affinity existing between its constituents. But when he gave white arsenic in doses of two ounces and upwards, and followed it by sixty-four ounces of the hydrated oxide, the animals survived. In several instances, the horses thus treated were killed at the end of nine days, and the stomach and intestines bore the marks of the action of the poison, but evidently in a mitigated degree, and sufficient to show that it had been promptly counteracted. In one case, the antidote was delayed twenty-five hours, and the consequence was, the death of the animal twenty-four hours thereafter, and the stomach, intestines and heart bore marks of the violence of the poison.†

M. M. Miguel and Soubeiran of Paris were probably the next experimenters. They found that if a large dose of arsenic was given to dogs, and they were allowed to vomit, it produced no effect, and it was therefore necessary to tie the œsophagus. But this in itself is a fatal operation, and the time that the animal could survive required to be ascertained. A dog

* American Journal of Medical Sciences, vol. xvi, 239.

† Annales D'Hygiène, vol. xii, p. 134; American Journal, August, 1835, p. 518.

whose œsophagus was tied, died in seventy-eight hours, but if nine or ten grains of arsenic were given, and the œsophagus then tied, death followed in two or two and a half hours. In their experiments they used the recently prepared peroxide of hydrated iron mixed with water, in the proportion of twelve parts, to one of white arsenic.

In several instances of dogs thus treated, they survived from seventy-eight hours to six days. But if the exhibition of the antidote was delayed, the animals perished, and the time of death appeared to be hastened exactly in proportion to the delay.*

Again, Drs. Borelli and Demaria of Turin performed experiments also on dogs with even more favourable results. They consider that four and a half parts by weight of the peroxide are required to neutralise one of arsenious acid.†

Dr. Van Speez of Vienna had similar success. He gave arsenic both in powder and in solution, and though in the last the symptoms were more violent, yet in all the animals recovered. He even exhibited the rust of iron successfully.‡

Dr. Donald Mackenzie of Edinburgh has related a number of successful experiments on dogs, with arsenic in the solid form, followed by the antidote in the proportion of from twelve to thirty parts. They were killed, either on the first, third or sixth day after, and the stomach and intestines were found but slightly reddened.§

Lastly I may mention the result obtained by a committee of the Academy of Medicine at Paris, in which not only the hydrated peroxide was found efficient on dogs, but also the common subcarbonate of iron largely suspended in water, four ounces in twenty-four of water. The committee advise that at least half an ounce of peroxide should be taken for each grain of arsenious acid supposed to remain in the stomach.||

To all this mass of favourable testimony, there can only be opposed the unfavourable results obtained by Mr. Brett and Mr. Orton, (*London Medical Gazette*, vol. xv, p. 220, *Lancet*, November 8, 1834.) But it must be remembered that their investigations were made at an early period of the inquiry; and I may further adopt the remarks of Dr. MacLagan of Edinburgh concerning them. "With respect to the former, it may be observed, that he appears uniformly to have used too small quantities of the oxide, and the experiments of the latter hardly seem to have been made with sufficient care, as appears in one instance, at least from his having injected both poison and antidote into the lungs, instead of the stomach of the rabbit.¶

* British and Foreign Medical Review, vol. i, p. 594.

† British and Foreign Medical Review, vol. i, p. 595.

‡ American Journ. Med. Sci., February, 1838, p. 519.

§ *Lancet*, April 4, 1840. Amer. Journ. Med. Sci., August, 1840, p. 497.

|| American Journ. Med. Sci., February, 1838, p. 519.

¶ *On the Action of the Hydrated Sesquioxide of Iron on Arsenic*, by Douglass MacLagan

III. *Its Efficacy as an Antidote on Man.*—In referring to these, I must be brief, indicating merely the leading points worthy of notice.

1. The first case on record is probably that of M. Leger. A child eighteen months old, drank a solution of fly poison, (probably a variable combination of black oxide of arsenic and oxide of cobalt,) and was immediately seized with symptoms of violent colic. The accident was soon discovered, and the hydrated peroxide was instantly given. Its effects were completely successful within a few hours. *American Journal of the Medical Sciences*, vol. xvi, p. 239.

2. M. Geoffroy of Paris gave it in twenty minutes after arsenic, stirred about in water, had been swallowed by a man aged 36. Four or five pints of water, charged with it, were given in a quarter of an hour. Vomiting ensued; but the patient suffered none of the ordinary symptoms of arsenic. He had taken a drachm and a half of arsenic. The next morning he was well. *British and Foreign Medical Review*, vol. i, p. 572. *American Journ. Med. Sci.*, February, 1836, p. 501.

3. Drs. Bineau and Majesté of Saumur, in France, relate five cases that occurred in 1835. As many little girls aged from five to nine years, on leaving school, ate part of a cake, containing one fifth of its weight of white arsenic which had been prepared to kill rats. They all were affected violently with the early symptoms of poisoning, and were not seen until two hours or more after the accident, yet all recovered by the free use of the antidote. *B. and F. Med. Rev.*, vol. i, p. 573.

4. Dr. Buzorini relates in *La Lancette Francaise*, November 17, 1835, two cases successfully treated. *American Journ.*, August, 1836, p. 504.

5. Dr. Chilton of New York, in the United States, *Med. and Surg. Journal*, vol. iii, p. 54, also relates a successful case.

6. Mr. Robson, of Warrington, administered with success first, the sub-carbonate of iron, in doses of six drachms, two hours after the poison had been taken, and afterwards the prepared oxide. Nearly three drachms of arsenic had been swallowed. *American Journ. Med. Sci.*, May, 1837, p. 222.

7. Dr. Thomas, of Baltimore, in a case where twenty grains of arsenic in powder had been given, gave the peroxide with success. *American Med. Intelligencer*, vol. ii, p. 117.

8. Dr. Macdonald—a successful case in *New York Journal of Medicine and Surgery*, vol. ii, p. 205.

M. D., Lecturer on Materia Medica. *Edinburgh Medical and Surgical Journal*, vol. liv, p. 106. This is a valuable paper in reference to the chemical action of these substances on each other. I have only space to notice the conclusion to which he arrives, and which is, that “the hydrated oxide of iron is a real chemical antidote to arsenious acid, and that when it removes arsenic from solution and soluble combinations, it acts by chemically uniting with it.” The large quantities which have been found necessary, are required, not to protect the stomach mechanically, but to render the poison chemically inert.

9. Dr. Gerhard—a successful case in the *Philadelphia Medical Examiner*, vol. iii, p. 250.

10. Drs. Smiley and Wallace in the *Philadelphia Medical Examiner*, vol. iii, p. 679, out of a family of eight persons poisoned by a pudding of Indian meal, prepared for rats, death followed in two cases in seven and nine hours. They could not retain the antidote, but immediately rejected it. The symptoms of all the others were immediately mitigated by its use, and they all recovered.

11. Dr. Murray, of India, successful. *Amer. Journ. Med. Sci.*, Feb., 1839, p. 503, from the *Calcutta Medical Journal*, December, 1837.

12. Mr. Deville, of Paris, successful. *American Journ. Med. Sci.*, May, 1839, p. 243.

13. Dr. Puchelt, Jun., seven cases of recovery. *Edinburgh Medical and Surgical Journal*, vol. liv, p. 263.

It would not be difficult to add considerably to this list. But I have adduced enough to warrant a belief in the efficacy of the antidote. I trust, however, that none of my readers will be led to suppose, that in cases of poisoning by arsenic, they are to depend *solely* on it. Vomiting should be promoted as early as possible, and indeed every mode now in use for the speedy evacuation of the poison. The antidote will find sufficient to operate on what still remains and cannot be removed.

4. *The Mode of its Preparation and Exhibition.* Lassaigne had recommended the following process. Take iron turnings, pour on them four times their weight of the nitric acid of commerce gradually, so as to avoid too rapid an action. A portion of the nitric acid will yield its oxygen to the iron, and change it to a peroxide, which unites with the undecomposed nitric acid, and forms pernitate of iron. As soon as the action of the nitrous vapour has ceased, add ten or twelve parts of water to dissolve the pernitate and to precipitate the undissolved turnings. Decant and filter the solution, and add aqua ammonia, until litmus paper becomes blue. A yellowish brown precipitate is formed, which is the hydrate, and which should be washed with boiling water, to free it from the remains of the acid.

Drs. Bunsen and Berthold, however, prefer that preparation obtained by taking a pure solution of the sub-sulphate of iron, increasing its dose of oxygen by heating it with nitric acid, and then pouring into the solution an excess of caustic ammonia. The hydrated oxide is now obtained by decantation. They advise that the nitric acid be added in small portions at a time, otherwise a quantity of the neutral sulphate of the sesquioxide is separated in the form of a yellow powder, which is but slightly soluble. They also insist on the danger of using any other alkali than ammonia.

The Edinburgh college has introduced it into its pharmacopœia, with nearly identical directions, which I copy from Dr. MacLagan's paper, already referred to. "Dissolve sulphate of iron in water, with a little sulphuric acid, adding nitric acid by degrees till it is thus fully oxygenated, and then

precipitating the hydrated sesquioxide from this solution by an excess of ammonia. 'The product thus obtained is of a deep reddish brown.' It should be carefully washed, to remove the ammonia; but this can hardly be completely effected without the application of heat; and I apprehend that this last is not to be recommended.

The dry hydrated oxide is inert. It is therefore necessary to keep the antidote, when prepared, under water. It may thus be preserved uninjured in its qualities for a length of time. Professor Fisher, of Maryland, has shown this conclusively in an elaborate paper in the twelfth volume of the *American Journal of Pharmacy*. "In the moist state, it is in the finest possible state of division, and hence best adapted as an antidote."

It is not necessary therefore to have it *freshly prepared* for every case, and the practitioner has only to keep a quantity on hand in closely stopped bottles, remembering to shake it well before administration.

As to the quantity necessary to be given, I will again quote Dr. MacLagan. "As far as chemical evidence goes, at least twelve parts of oxide, prepared by ammonia, and moist, are required for each part of arsenic, and this same proportion has been indicated by several of the French experimentalists as being required to insure its antidotal effects."

But it may be said that in some instances we cannot ascertain how much arsenic has been taken, and the inquiry may be renewed, how are we then to act. To this, I reply, by recommending that to an adult, a tablespoonful, and for children a desert spoonful, should be given every five or ten minutes until relief from the urgent symptoms is obtained.

ALBANY, May 19, 1841.

ART. VIII.—*Case of Nephritis.* By A. B. SNOW, M. D., of Boston, Mass.

Read before the Boston Society for Medical Improvement, March 23, 1841.

BUT few unequivocal cases of acute nephritis have been recorded in the medical annals of this country; not because the disease is of unfrequent occurrence, but because the symptoms indicating it so often resemble those of other affections, that it is not recognised; and when suspected, the opportunities for post mortem examinations are so restricted, that its existence cannot be verified; and consequently, many practitioners actually deny that it ever obtains. The following case will be interesting to the profession, inasmuch as it demonstrates that the disease does occur as idiopathic, and also that it is a disease of very great severity, and that its symptoms are peculiar and in some respects specific.

March 4, 1841. Mrs. T., ætat. 61, had led a very regular, industrious