tration of alcohol—an experiment I have never failed to regret, as my results were not nearly so satisfactory during that period. I give whisky in doses of 15, 30, or 40 minims, according to the age and condition of the child, every two or four hours, and once its administration is commenced I generally find it necessary to continue it until convalescence is established. In all cases I give strychnine in minim doses of the liquor every four hours as a routine practice. It acts as a cardiac and respiratory stimulant, as a stomachic and nerve tonic, and it seems to help the contraction of the muscular walls of the bronchi and thus assist the expulsion of mucus. The only cases in which I omit the strychnine are when diarrhoea occurs and when there is marked respiratory stridor.

When signs of advancing cardiac strain make their appearance, evidenced by irregularity of the pulse and increasing cyanosis, to the strychnine I add 1-minim doses of 1885 tincture of strophanthus, finding by experience that strychnine and strophanthus better maintain the blood pressure than digitalis, and they have no injurious effect on gastric digestion. I am a firm believer in the efficacy of the inhalation of oxygen, and have frequently been amazed at the improvement in the child's condition which followed its administration, the breathing and colour improving and the somnolence and cyanosis becoming much less marked. I regard it as a valuable remedy in the treatment of these symptoms. The only means I advocate for the reduction of high temperature is tepid sponging and the cold pack. When sudden collapse of a portion of the lung sets in, I rely upon free alcoholic stimulation and placing the child in a mustard bath. I have entirely given up the administration of cough mixtures, having seen little good result from them, and consider that they are very liable to upset the child's digestion, which it is so important should be kept undisturbed. When the bronchi are choked with secretion and the child is strong, an emetic of ipecacuhana often gives great relief, and, failing that, I have occasionally seen exceedingly good results from the administration of belladonna.

During convalescence, nourishing food, small quantities of good old port wine, quinine, cod-liver oil, and change of air are the methods of treatment on which I place most reliance.

I conclude this paper as I commenced—by remarking that though I have not wandered very far from the beaten track, I have endeavoured to state my own impressions without referring to the work of others, and to give the results of my own experience for what they are worth.

THE PHYSIOLOGICAL ANTAGONISM BETWEEN ACONITE AND BELLADONNA.

By HENRY SPEIRS, M.D.,
GAVINTON, DUNS, N.B.

COMPLETE physiological antagonism amongst drugs, especially alkaloids, is well known to be extremely rare. The following case, which came recently under my observation, seems worthy of record, in that it illustrates the partial antagonism existing between aconite and belladonna, as well as from the fact that the patient recovered after an enormous overdose of both these drugs taken simultaneously:

J. Y., aged 48, suffering from a subacute attack of pleurisy, was recommended by me to take an expectorant mixture and at the same time was given a 6 oz. bottle of aconite, belladonna, and chloroform liniment for external application to the chest. The liniment was dispensed in a blue bottle, labelled poison, but nevertheless the patient on the following morning swallowed by mistake $\frac{1}{2}$ oz. of the wrong bottle. He immediately recognized his error, but did not realize its seriousness. About four hours after its commission his relatives became alarmed and hurriedly summoned me to attend him.

I saw him about four and a half hours after the poison had been swallowed. Apart from copious libations of warm water, no emetics had been taken, and consequently the full $\frac{1}{2}$ oz. of liniment had been absorbed.

The patient was in a state of active delirium, his pupils so widely dilated that only a fine rim of iris was visible. At times he became exceedingly violent, and struck out at those who were vainly attempting to restrain him. He kept constantly muttering and grasping at objects within reach, totally mistaking their identity. At one time he would become violently maniacal, and a few moments later would subside into fits of unrestrained mirth. The pulse was rapid, about 180, small, and thready, and during a violent paroxysm became undiscernible

at the wrist. The tongue was dry and parched, the lips pale and slightly cyanotic, while sordes accumulated at the angles of the mouth. Malar flushing, a characteristic sign of belladonna poisoning, was, however, absent. On the patient endeavouring to stand, distinct muscular weakness was apparent; his legs appeared to give way and he required to be supported. A fine fibrillary tremor was present in the muscles of both extremities. He talked irrationally, and being offered stimulant, clenched his teeth and refused.

Altogether the patient seemed to be approaching a condition of very grave collapse, and, under the circumstances, I did not feel induced to administer morphine, the usual antidote in belladonna poisoning. The stomach tube was also too late to be of service. I injected 10 m liq. strychn. hyd., and repeated the dose in ten minutes. A saline enema, Oij, with $\frac{3}{4}$ ij brandy, was quickly administered, and a hot mustard poultice applied to the precordia.

These measures seemed to bring about some improvement, as the pulse was reduced in frequency and its volume increased. He, however, continued restless, and at times violent, and I decided to remove him to hospital. Here morphine ($\frac{1}{4}$ grain) was immediately administered, with the result that his violence gradually became subdued. Consciousness returned at about 11 p.m. the same day—exactly twelve hours after the ingestion of the poison. With the exception of retention of urine, which lasted during the next day, and a continued pupillary dilatation lasting for six days, the patient soon completely recovered.

It would appear that the patient took 53.3 grains of aconite root, which is at least twenty-seven times a safe dose. It represents $\frac{1}{4}$ grain aconitine, of which $\frac{1}{8}$ grain has been known to be fatal. He also swallowed 40 m ext. belladonnae liq., which is equal to 0.3 grain of the total alkaloids. This would represent something like thirty times the official dose of atropine. Recoveries, however, have been reported after larger doses of this alkaloid, from $3\frac{1}{2}$ to $5\frac{1}{2}$ grains having been taken without a lethal termination. Of chloroform he took 40 m, about eight times the official dose.

The interest of the case lies in the fact that the lethal effect of a large dose of aconite was abolished by the action of a large dose of belladonna. Muscular weakness, numbing of the extremities, and the tendency to complete collapse were all the purely aconite symptoms to be observed. Salivation, usually present in aconite poisoning, was absent, while the usually contracted pupil was lost in the powerful dilating influence of atropine. Finally, the intensely depressant action of aconite on the central nervous system was counteracted by the more stimulating action of belladonna.

The obvious lesson to be drawn is the great value which should be attached to hypodermic injections of atropine in all cases of aconite poisoning, and one can hardly avoid a word of tribute to the wisdom of the framers of our *Pharmacopoeia* in compounding pharmacological antidotes in many of their formulæ.

A NEW APPARATUS FOR CHLOROFORM ANAESTHESIA.

By N. H. ALCOCK, M.D.

(FROM THE PHYSIOLOGICAL LABORATORY, ST. MARY'S HOSPITAL, PADDINGTON.)

It has been evident for some time past that the open method of chloroform anaesthesia, although almost universally adopted, is attended by the disadvantages that are inseparable from the administration of an active drug in unmeasured quantity. That untoward consequences are not more numerous is a tribute to the skill of the anaesthetist, but even the best intentions are sometimes unequal to the very difficult task of supplementing the deficiencies of an unsatisfactory method, and "accidents" such as are recorded in the newspapers emphasize the necessity of a more exact method of administration.

The first step in such a method is to construct an apparatus that shall deliver a known admixture of chloroform vapour and air. Several machines have been already made by Dubois, Vernon-Harcourt, Waller, Collingwood and others, and the result of the work of these experimenters has been of very great assistance in the present research. I would particularly express my indebtedness to the densimetric method of Waller and Geets, without which the construction and testing of this apparatus would have presented even greater difficulties than were met with.

The apparatus consists of a circular copper vessel 5 in. in diameter and $4\frac{1}{2}$ in. deep, which contains 150 c.cm. of

chloroform; $1\frac{1}{4}$ in. from the bottom is fixed a shelf closed except for two oblong holes. Immediately above and touching this shelf is a circular plate, movable by means of a hollow rod in the centre, and pierced by two triangular apertures. These can be adjusted by the centre rod so as to expose more or less of the fixed oblong holes in the shelf and so produce greater or smaller openings into the space below. Air (supplied from a small foot bellows) enters the chamber by one tube opposite one aperture, and leaves by another tube, taking up more or less chloroform vapour according to the size of the apertures. A thermometer in the hollow rod indicates the temperature of the chloroform below, and a water jacket surrounding the chamber serves to keep the temperature between certain limits.

An apparatus of this pattern has certain convenient peculiarities. Taking 0.1 per cent. as the limit of permissible error, it was found by direct measurement that the percentage of vapour in the air was independent of the current between 8 litres per minute and 20 litres, the latter amount being considerably in excess of what is usually required. If the air current falls below 8 litres per minute the percentage of chloroform falls. The percentage is also independent of shaking, and the whole apparatus can be rocked to and fro and moved about much more violently than is at all likely to happen under service conditions without making any change.

Variations in temperature produce a considerable effect, but if the scale indicating the percentage is made to slide, this can be corrected for (within the limits of 0.1 per cent. error) between 60° F. and 70° F., and even between 55° F. and 75° F. the additional error (greatest at the extreme ends of the scale) does not exceed 0.2 per cent., the scale being graduated to show from 0.1 to 3.5 per cent.—a range of concentration ample for all purposes.

As will be seen from the measurements given, the whole apparatus is not too large or cumbersome to be carried round and used by the general practitioner, and as the air supply is given from a foot bellows, leaving both hands free, it is quite feasible for one man to use the machine by himself if need be.

The consideration of the many very interesting problems connected with the administration of known percentages must be deferred until further observations have been made, which I hope to carry out with the co-operation of Dr. Blumfeld. Certain points may, however, be briefly mentioned: Complete anaesthesia is obtained in "normal" cases in about seven and a half minutes, using chloroform vapour gradually rising to 2.5 per cent. Some cases vary from this amount, one class requiring a less percentage and shorter time, others an increase in both. It does not seem necessary to go above 3 per cent. to produce anaesthesia, even in alcoholic patients.

An even degree of anaesthesia can be easily maintained, and, as far as can be seen at the present time, the danger of "primary cardiac failure" is at least minimized. But, considering the greatly varying conditions met with in practice, further observations are desirable before making any general statements on these points.

I have very much pleasure, in conclusion, in expressing my thanks to those who have given me such valuable aid in the course of this research. Miss E. M. Curwen has given me great assistance in the testing of the apparatus. Dr. Mathison has also assisted me in this matter, and I owe the clinical data to the kindness of my colleagues at St. Mary's Hospital, whose co-operation has been of the greatest service. Lastly, I am indebted for many practical suggestions to Mr. C. F. Palmer, of 6, Upper Tulse Hill, the maker of the apparatus.

ZINC IONIZATION IN CHRONIC URETHRITIS.

By P CLENNELL FENWICK, M.D.N.Z., M.B.LOND.,

F.R.C.S.ED.,

CHRISTCHURCH, NEW ZEALAND.

My attention was drawn to the value of zinc ionization in rodent ulcer by Dr. Lewis Jones some months ago. After using this treatment with success in three cases of rodent ulcer I wondered if the same method could not be used in chronic catarrh of the urethra. I have now been successful in two cases of chronic urethral discharge of long standing.

CASE I.—B. R., aged 30 years, was sent to me with the diagnosis of chronic gleet. He gave the following history: Ten years ago he had his first attack of gonorrhoea. This was cured after considerable treatment. Two years ago he contracted a second infection, and has remained uncured till now. He has a white discharge, which drops from the meatus on squeezing the urethra. The meatal lips are glued together on rising in the morning. The urine does not scald, and the stream is not forked. The bowels are constipated. The prostate is normal. He is a teetotaler and smokes very little. He had used many injections and unlimited medicines, and was very depressed at his continued ill-health. I thought this would be an excellent case on which to test the zinc treatment. A urethral cannula was passed and the urethra examined with the urethroscope. The walls of the canal were flabby, the vessels emptied slowly under air pressure. There was no stricture, and I could detect no local lesion. I considered the case one of chronic urethral catarrh. The canal was dried with little swabs. A long straight probe was wrapped with fine lint and soaked in zinc sulphate solution (2 per cent.) and passed through the cannula. The cannula was then withdrawn, leaving the probe in the urethra. The end of the probe which projected from the meatus was connected with a constant current battery (positive pole) and a big negative pad was placed under the patient's loins. Two milliamperes of current were passed for ten minutes without causing any pain except a slight tingling. The current was switched off and the probe withdrawn. The canal had contracted on to the probe, and some care had to be taken in withdrawing the instrument. I examined the urethra with the urethroscope, and the interior was quite white and brilliant. I saw the patient next day, and he was glad to tell me that he had seen no discharge for the first time for two years. I repeated the treatment twice more, and the discharge has not returned. The patient's health, both mental and physical, has improved immensely, and I think it a fair inference to consider this case as cured.

CASE II.—C. J., aged 27 years. Has had three attacks of gonorrhoea during the last five years. The last infection occurred twelve months ago. The discharge has never ceased, and runs from the meatus all day. He loses a teaspoonful of thick yellow matter during the day. The lips of the meatus are always glued together when he rises. There is no scalding, no forking of the urinary stream, no prostatic tenderness. Under the electric light the canal is flabby, the walls "soggy," almost oedematous. The meatus is very large. There is no stricture. I passed the wrapped probe through the cannula and left it in the urethra, withdrew the cannula, and connected the probe to the battery, placed the negative pad beneath the loins, and passed 3 milliamperes through the probe for ten minutes. Next evening he reported "hardly any discharge," and after five treatments the discharge ceased. Three months later he reported: "I can sometimes see a little moisture in the mornings, but there is no discharge." On one occasion, when the urethral canal seemed too small to hold the probe with its wrappings, I filled the canal with zinc solution, tied a thin india-rubber cord round the corona, and placed small, straight electrodes above and below the penis, fixing them in place with another india-rubber band. I then passed 5 milliamperes. On examining the urethra afterwards with the electric light I found the urethral canal showed the same glistening appearance that had resulted from the use of the probe. This, I think, is a matter of value, for if the same results are obtained either by using an intraurethral electrode, or by filling the canal with the solution and passing a current from electrodes placed on the dorsal and ventral aspects of the penis, it will be easier to treat cases where a small meatus is present.

One point which impressed me was the great contraction of the urethral canal upon the probe which occurred after the current had been passed. On one occasion I found some difficulty in withdrawing the probe, as the urethra gripped the lint firmly. This is in itself, I think, a proof that the zinc solution is really driven into the mucous membrane.

I do not know if this treatment has been tried before, but I thought these cases of sufficient interest to the general practitioner to report.