linen, as no local applications following treatment are necessary, or, indeed, desirable. A dosimeter is unnecessary. If the operator takes the trouble to estimate at regular intervals the efficiency of the lamp used, the erythema dose for the individual is easily and quickly ascertained, and even when this is not done, but the dose gauged from previous experience with the lamp in use, there is a wide margin of safety.

SUMMARY AND CONCLUSIONS

1. A report is presented on fifty-one cases of erysipelas treated by exposure to an artificial source of ultra-violet light, the exposure being one and a half times to twice that required to produce a definite erythema on normal skin.
2. The treatment of erysipelas, particularly the early case, by ultra-violet light appeared to give better results than other methods in use.
3. The method is easily applied, usually available, devoid of danger, cleanly, and inexpensive.
4. The technique is simple, and can be carried out with any ultra-violet lamp of known efficiency.

The cases detailed are from the records of the Edinburgh City Hospital. The opportunity for, and inception of, this investigation are due to Dr. W. T. Benson, superintendent of that institution, to whom the writer is much indebted.

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CARBON DIOXIDE ABSORPTION METHODS IN ANAESTHESIA

BY

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Nitrous oxide and oxygen is now so universally used that the anaesthetist has to transport an apparatus of considerable bulk and enormous weight. It was in an attempt to find a really portable apparatus that a trial of the carbon dioxide filtration method was decided upon. This method has many advantages, and, as far as can be seen, no disadvantages.

In the past carbon dioxide filtration had fallen into disrepute owing to the large size of the canister and the fact that it was bulky and awkward to hold right up at the face-piece. Nowadays all this is changed by the use of wide-bore Siebe Gorman tubing, with flap valves to ensure the unidirectional flow of expired gases. This enables the absorber unit to be attached to the anaesthetic stand, head of the table, or gas machine itself, while the application of the mask to the face is no longer a wearisome task. By means of this unidirectional method of flow of respired gases the absorber canister need not be the bulky apparatus of the past. Much experimental work has been done on this method in America by Lundy, Heidbrinck Company, and Foregger Company and McKesson, to name a few, so that it is by no means an innovation. Hewer also employed the method some years ago in this country. In the writer's opinion, however, the success of the apparatus lies (1) in the unidirectional method of flow, abolishing dead spaces, (2) in the passing the gases twice through the absorber, and (3) in effecting this with as little resistance as possible to the flow. Accuracy in oxygen supply is another step towards perfection, for a difference of 30 c.cm. of oxygen

per breath will make an enormous difference in percentage composition of the respired gases. For this purpose I have had constructed a special flowmeter for small flows of from 250 c.cm. oxygen upwards.

Briefly the principle, as is well known, lies in the absorption of the patient's carbon dioxide by soda lime. The patient rebreathes the same amount of nitrous oxide continuously, as this is given out from the lungs unchanged. Oxygen is used constantly, of course, and it is necessary to give accurately graded quantities of this latter gas continually. Ether, when employed, can be added to replace what has been used up. By this method one consumes an extremely small quantity of gas. One or two gallons per hour is the usual amount, as opposed to 100 to 150 gallons per hour—a great saving.

APPARATUS

This consists of a "circular rebreather" as compared with the ordinary single-tube to-and-fro method. In the face-piece mount are two very fine flap valves made from thin Paul's tubing. These valves are the most important

Absorber attached to Boyle's machine. The lower part of the drawing depicting the cylinders is diagrammatic, but the upper half is to scale.

part of the apparatus, as they are used to ensure the flow of the gases in a unidirectional manner, and their inertia is so small that breathing is not in any way impeded. From this mount two 30 in. Siebe Gorman tubes run to a Y-piece, which is connected with the absorber. The latter is about 4 in. long and 3 in. wide, and holds 1 lb. of soda lime granules. These are kept in position by two gauzes at each end of the machine, one fine and one coarse. The absorber must be absolutely full of soda lime for successful operation. Breathing is not obstructed, as one might suppose, largely owing to the fact that the soda lime used is not too great in quantity. Attached to the soda lime canister is a bag of one gallon capacity, with a tube for the admission of

oxygen, etc. Ether is admitted to the apparatus in one of two ways—by a Clover inhaler, or by the oxygen tube from a Boyle's machine.

TECHNIQUE OF ADMINISTRATION

The canister is supported by clips to the Boyle's machine, leaving the face-piece free. The patient is induced with gas and oxygen till consciousness is lost. Then a Clausen harness is fastened over the face to ensure a gas-tight fit of the face-piece: this is most important. The expiratory valve is now closed down tightly and the gas flow stopped. The oxygen supply is reduced to 300 to 500 c.cm. per minute. Ether is now added from the Clover if this instrument is in use, or by the oxygen being allowed to bubble through the ether in the Boyle's machine.

Diagram showing direction of flow.

Absorber with Clover attached fixed to head of table.

In practice it is found that some nitrous oxide always leaks away, so that a few cubic centimeters are added from time to time to keep the bag full, but actually only one to two gallons are needed per hour. One cannot use this method on less, as gas always leaks away a little, and it has been shown that nitrous oxide is excreted by the skin in small amounts. One charge of soda lime lasts for six to eight anaesthetic hours and all the apparatus can be sterilized by boiling. The flutter valves are easily replaced, and give no trouble. No provision has been made for switching out the absorber from the circuit. It is so easy to plug the bag directly on to the Y-piece that it was felt advisable to avoid further sources of possible leaks. In practice it is found that the respiration rate with the absorber in use is quite unchanged, its depth, too, being almost unaltered, and not nearly as great as that obtained with a Clover's ether inhaler or similar closed method of anaesthesia.

CONCLUSIONS

The method has no disadvantages. Its advantages, which are many, are as follows:

1. To the patient: (a) No loss of heat through the lung, and therefore (b) less risk of bronchitis, etc. (c) Minimal use of ether.
2. To the anaesthetist: (a) No smell of anaesthetic in the theatre. (b) Economy in gas and ether. (c) Extreme portability—twenty-five-gallon cylinders need only be carried instead of hundred-gallon ones—a great saving in weight.

The apparatus was made for me by A. Charles King, Ltd., Devonshire Street, W.I.

THE USE OF TAKAYAMA'S SOLUTION IN THE IDENTIFICATION OF BLOOD STAINS*

BY

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Though the importance of the production and identification of crystals derived from blood in medico-legal cases has received much emphasis in the literature, little change has occurred in recent years in the methods employed for their demonstration.

HISTORY OF TESTS

Teichmann in 1853 noted the appearance of brownish rhombic crystals when blood was treated with glacial acetic acid and a trace of sodium chloride. These crystals were later identified as being those of haematin chloride, and since then it has been recognized universally that their presence is proof of the identity of the suspected stain with blood. Unfortunately it was soon found that such crystals could only be demonstrated with difficulty and uncertainty. Many attempts to modify the technique and to simplify the procedure were made, but few of these modifications had much to offer. Probably the best was devised by Sutherland,¹ who suggested that a small drop of normal saline should be evaporated to dryness on a slide before the fragments of the suspected stain were deposited on it; glacial acetic acid was then added and the slide heated gently. Even this method frequently fails of its object. Later Donogány and Bürker² suggested the use of pyridine for demonstrating haemochromogen crystals in blood. Pyridine used alone, however, gave rather uncertain results, and attempts were made to devise a solution containing this reagent which would be more successful. Takayama³ in 1912 suggested a solution of the following composition:

Pyridine	...	...	...	...	3 ml.
Sodium hydrate, 10 per cent. solution	...	...	...	...	3 ml.
Dextrose, sat. solution	...	...	...	...	3 ml.
Distilled water	...	...	...	...	7 ml.

Mahler⁴ in 1923, and Kerr and Mason⁵ in 1926, reported favourable results with this solution, and since this time it has found mention in a hesitating way in some of the textbooks, though it has obviously not attained the recognition to which its usefulness entitles it. It has given un-failing satisfaction in my own hands, and I feel that it deserves to be incorporated more widely into routine usage. Sutherland, in a textbook article on blood stains, describes his own routine method of examination of suspected stains as follows: He removes a tiny fragment of the material containing the stain, plunges it into boiling water for a few seconds, transfers it to a slide, and removes the water by blotting. A drop or two of 10 per cent. KCN solution is now added, and the slide again blotted; finally, a drop of strong ammonium sulphide solution is placed on the fragment, a cover-slip adjusted, and the preparation examined microscopically. If blood is present a salmon-pink colour will be seen, and microspectroscopic examination will show the spectrum of haemochromogen. He feels that no further proof of the presence of blood is required.

TECHNIQUE OF METHOD

The method of using Takayama's solution to be described accomplishes all that Sutherland's method does, but in addition demonstrates haemochromogen crystals,

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