reaction, in 1 agreement with the Sigma, in 1 partial agreement with the Sigma, and in 2 partial agreement with the Wassermann reaction. False positives may therefore be reduced to 3 (in 2 of which the readings were N P, P, and D P P respectively). There were 6 apparently false positive Wassermann reactions. In 2 the Kahn agreed; in 2 the Kahn partially agreed; in 1 the Sigma partially agreed, and one case was probably syphilis. There were thus 3 "false positives," which gave the following readings: $+\pm$ (test repeated with the same result), $+$ (test repeated with the same result), and $+$. There was 1 apparently false positive Sigma test with which the Kahn agreed.

Conclusions.

From the above it would appear that whilst there was a high percentage of agreement between the three tests the results were slightly, but definitely, in favour of the Kahn. It is not suggested that this test could or should replace the Wassermann, but it is a very useful additional test, especially in cases where the diagnosis is in doubt

or where the Wassermann reaction gives a $\pm$ result. The Kahn test appears to give a definitely greater proportion of positives in cases of treated syphilis; in other words, it remains positive longer than the Wassermann during treatment. It is probable that had the Sigma tests been carried to the full incubation period of forty to forty-four hours a greater number of positives would have been obtained, but this was not done on account of the extra time involved and consequent delay.

The chief advantage of the Kahn test is its simplicity. It does not require as many ingredients as the Wassermann nor the complicated titrations; it is much more rapidly carried out than the Sigma with its somewhat elaborate apparatus. A reliable result of a Kahn test can be given within an hour of receiving the serum.

I have to thank Colonel L. W. Harrison, D.S.O., F.R.C.P.Ed., Director of the Venereal Department, St. Thomas's Hospital, for permission to publish these figures.

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A COMPARISON OF THE EFFICIENCY OF SOME METHODS OF OXYGEN ADMINISTRATION.

BY

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ANOXAEMIA has been classified by Barcroft¹ as follows: (1) Anoxic, when the blood has failed to pick up its proper load of oxygen in the lungs, so that its oxygen pressure is too low; (2) anaemic, when the blood has picked up all it can carry, so that its oxygen pressure is normal, but owing to deficiency of haemoglobin its load is not sufficiently great; (3) stagnant, when the oxygen in the arterial blood is normal, but the flow through the capillaries is too slow.

It is in the anoxic type that oxygen administration is especially indicated, as occurs, for example, in lobar pneumonia.

Methods.

Accounts of the different methods which are in use have been given by numerous authors.²⁻⁹ The methods studied in this paper are (a) the tube and funnel held closely over the mouth and nose, and

(b) at a measured distance; (c) a nasal catheter inserted in one nostril, with its end in the nasopharynx; (d) the Haldane mask; (e) a new mask over the mouth only.

The basis of comparison chosen is the pressure of oxygen in the alveolar air of a normal subject breathing at known rate and depth. Only respiratory methods of administration are mentioned here, because intravascular ways are considered dangerous and subcutaneous injections useless in view of the small amount that can be absorbed in comparison with the bodily needs.¹⁰

Findings.

Chart 1 shows that up to 4 litres a minute, given by a funnel held 10 cm. from the mouth, has no effect on the alveolar oxygen pressure. If, however, the funnel is pressed closely over the nose and under the chin the effect obtained is about the same as with a nasal catheter at the same rate of flow of oxygen. For example, oxygen given at $1\frac{1}{2}$ litres a minute will raise the alveolar oxygen pressure half as much again as when breathing air, whereas 3 litres will double it.

Chart 2, which is on a smaller scale, shows in addition

the alveolar oxygen when the Haldane mask is used. The figures here shown for the catheter and mask do not differ materially from those already published.⁸ Mention will be made later of the results obtained with the mouth-mask.

Comment.

It is incontestable that the face-mask method is a very efficient means of raising the alveolar oxygen; but every physician knows the clinical objections to the prolonged use of a mask which covers the mouth and nose. The reasons for a patient's intolerance may be physiological, such as slight obstruction to breathing, or an increase of the dead space with consequent rebreathing of a fraction of the expired air; it would seem that the reasons are also psycho-

logical, for even a normal person without dyspnoea feels hot and uncomfortable after wearing a mask for a few minutes. The nasal catheter is therefore used as a compromise. Against its manifest inferiority in raising the alveolar oxygen pressure must be set the fact of its simplicity and convenience both to patient and doctor. It can even be used in children.¹¹ By its use oxygen administration can be continued for days on end, uninterrupted by the necessity

of feeding, by coughing, or by sleeping. We have shown its effect on the alveolar oxygen. That this effect may be great enough to improve the oxygenation of the blood in lobar pneumonia is seen from the following cases.

Case 1.—Male, aged 44; respirations 42, pulse 125. The oxygen saturation of the arterial blood before giving oxygen was 85 per cent. Rate of flow of oxygen was 0.75 litre a minute by nasal catheter for fifteen minutes. The oxygen saturation was raised to 89 per cent.

Case 2.—Male, aged 50; respirations 35, pulse 112. The oxygen saturation of the arterial blood after having 0.5 litre of oxygen a minute by catheter for two hours was 80 per cent. The rate of flow was then increased to 1 litre a minute. Fifteen minutes later the oxygen saturation had risen to 88 per cent.

The rates of flow used in these two cases were, for experimental reasons, much below what should be employed. In pneumonia the flow should be slowly increased to at least 3 litres a minute. The catheter generally used in adults is a No. 9 oesophageal. The lateral hole should be near the tip; the terminal four inches are smeared with cocaine ointment, and the catheter is inserted into one nostril until a resistance is felt, when it is withdrawn slightly. If there is no obstruction in the nose the end should now be in the nasopharynx. The patient is more

CHART 1.

CHART 1.—Shows that oxygen given by a funnel held 10 cm. from the mouth does not enrich the alveolar air. Subject breathing 350 c.cm. per breath; respirations 15 a minute. (240 mm. is about equal to 33 per cent. oxygen in alveolar air.)

CHART 2.—(a) and (b) show pressures obtained with the new mouth-mask. (a) With the nostrils closed by cotton-wool. (b) Breathing air by the nose, oxygen by the mouth. (500 mm. is about equal to 70 per cent. oxygen in alveolar air.)

CHART 2.

* Receiving a grant from the Medical Research Council.

comfortable if the hole points downwards. The distance from the exterior to the nasopharynx is about three inches. The catheter can be conveniently fixed to the cheek by a piece of sticking-plaster. Prolonged personal use shows that passing the gas through warmed water lessens the discomfort; it also has the advantage of making the flow of gas visible. A flow meter is convenient, but not essential. The flow should be as fast as the patient will readily tolerate. A reducing valve or some sort of fine adjustment is most desirable, but in any case the catheter should be disconnected during any manipulation of the taps. Care should be taken to keep the tube leading to the patient free from water.

A New Modification.

As might be expected from the superiority of the face-mask over the catheter in raising the alveolar oxygen, it has also been observed clinically that the former method may remove entirely a cyanosis which the latter had only been able to lessen. Consideration of this, and of the drawbacks of the face-mask mentioned above, has led to the trial of a mouth-mask which allows the patient to breathe oxygen by the mouth while leaving the nose free to breathe air. It appears to be more comfortable and more willingly borne by the patient. The front is covered by a large flap of thin rubber, which gives a minimal resistance to expiration. The tube connecting the oxygen bag comes in underneath. The mouthpiece is provided with an inflated rubber cushion to make it fit comfortably; it is held in place by a piece of elastic which passes behind the head. Oxygen is breathed from a bag in which the gas collects during expiration, as described by Haldane. Gilchrist and Davies⁸ have described a modification of this principle, which is simple to make and highly efficient in use.* Chart 2 shows the effect on the alveolar oxygen; the highest figures are obtained if the nostrils are lightly plugged with cotton-wool. By this means in another subject the average alveolar oxygen was 650 mm.; but it is not considered advisable to maintain such high pressures indefinitely, since there is experimental evidence that pure oxygen for three days causes pulmonary oedema in certain animals.^{12, 13} Further work is in progress on the clinical use of this apparatus and the effect it has on the oxygen in the arterial blood.

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INTUSSUSCEPTION IN AN ADULT DUE TO A POLYP OF MECKEL'S DIVERTICULUM.

BY

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A CRITICAL study¹ of intussusception in the adult shows that in 36 per cent. of the cases an intestinal tumour is the predisposing cause. The tumours in order of frequency are: simple polyps, lipomata, fibromyomata, and adenomata; malignant growths rarely occur in this type of intestinal obstruction. In the following case the intussusception was caused by a pediculated polyp which arose from a Meckel's diverticulum.

A man, aged 40, who had previously enjoyed excellent health, complained of slight discomfort round the navel and in the right iliac fossa. He, however, continued to eat, work, and live his ordinary daily life, and his bowels at this time acted normally.

* Both this and the mouth-mask are obtainable from Siebe Gorman, Westminster Bridge Road.

Four days later, after his evening meal, he was attacked by severe abdominal pain, accompanied by vomiting, which had continued, in spite of all treatment, for ten days, when he was admitted to hospital. The vomited matter had been first food, then bile, and latterly it had developed a faecal odour. During these ten days the bowels, in spite of purges and enemata, were absolutely constipated. On admission the vomiting had ceased for twelve hours, but the pain continued, the pulse was 80, and the abdomen was distended, but not tense. Peristaltic waves were clearly visible, running transversely in the "ladder pattern." The hernial sites and the rectum were negative and no tumour could be felt in the abdomen.

About six hours after admission the abdomen was opened mesially below the navel, under morphine, intravenous somnifene, and intermittent ether anaesthesia. Coils of very dilated small bowel bulged into the wound, while the caecum was brought out with a little difficulty. To its inner side twisted coils of small intestine could only be partly unravelled, and further examination revealed a hard mass in the interior of the caecum. It now became obvious that an ileo-caecal intussusception had occurred, so the intracaecal mass was gently pushed out through the ileo-caecal valve and the intussusception rapidly reduced. On continuing to push the tumour further along towards more healthy bowel it was suddenly arrested about two feet from the caecum, its pedicle of attachment arising from the inner aspect of a broadish Meckel's diverticulum about the size of the last joint of the thumb. The diverticulum was of a blackish-purple hue; the proximal ileum was intensely congested and much distended, while the distal portion was narrowed.

Resection of the parts was decided on, so the bowel was divided fully six inches proximal, and about three inches distal, to the pedicle of the tumour. After careful haemostasis of the sudden mesentery the intestinal ends were rapidly closed by a purse-string suture over a Parker-Moynihan clamp, and lateral anastomosis was performed. Finally an enterostomy was performed about eight inches proximal to the anastomosis on the dilated loop, a small tube being rapidly fixed in the bowel by a couple of purse-string sutures. The intestine was then fixed by a single catgut stitch to the peritoneum of the wound; the abdomen was closed and the patient put back to bed in good condition. He slept tranquilly all night; the pulse never exceeded 100, and there was no vomiting. The ileostomy tube drained very freely for forty-eight hours, and the bowels moved naturally on the third day; the tube became loose on the fifth day, and the patient left the clinic a month after his operation, with the wound soundly healed.

In this case, since the intussusception was reducible, the question arises whether excision of the diverticulum, extraction of the polyp, and transverse suture of the bowel might not have sufficed. A table of statistics, however, in Gueulette's thesis² shows that in 104 cases resection was performed 60 times with 41 recoveries. In intestinal obstruction after the obstacle is removed experience leads to the belief that enterostomy on the distended proximal loop is an important factor in the successful issue.

The specimen, placed by Professor D. P. D. Wilkie in the museum of the surgical department, Edinburgh University, is a thick polyp about three inches long, springing from the inner surface of a flattish Meckel's diverticulum. Histological examination showed that the intestinal polyp consisted of fibrous tissue into which haemorrhage had taken place. There was no evidence of malignancy.

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BLASTOMYCOSIS OF EYE AND FACE SECONDARY TO LUNG INFECTION.

BY

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FUNGUS involvement of the lungs, according to the statistics of Colonel Marett, medical officer of health and States bacteriologist, is of frequent occurrence in Jersey. The following case is of great interest, as the eye and face conditions are definitely secondary to the lung infection.

A man, aged 58, was sent to me by Dr. Sydney Whitaker. The patient was very evidently ill and emaciated. There was slight sclero-keratitis with accompanying ciliary injection of the left eye. Within a week the limbal conjunctiva and episcleral tissue showed