draw further conclusions, but a more detailed report on the value of these and other fractions and concentrates of the vitamin B₁₂ group will be published in due course.

My thanks are due to Dr. E. Lester Smith and his associates, of Glaxo Laboratories Ltd., Greenford, for supplies of differentiated members of the vitamin B₁₂ group; to those physicians, pathologists, and general practitioners who referred relapsed cases of pernicious anaemia for investigation; and to my technical staff, particularly Mr. S. E. Louland, for their assistance.

REFERENCES

- Anslow, W. K., Ball, S., Emery, W. B., Fantes, K. H., Smith, E. Lester, and Walker, A. D. (1950). *Chem. & Ind.*, p. 574.
 Biggs, R., and Macmillan, R. L. (1948). *J. clin. Path.*, 1, 269.
 Brockman, J. A., jun., Pierce, J. V., Stokstad, E. L. R., Broquist, H. P., and Jukes, T. H. (1950). *J. Amer. chem. Soc.*, 72, 1042.
 Buchanan, J. G., Johnson, A. W., Mills, J. A., and Todd, A. R. (1950). *Chem. & Ind.*, p. 426.
 Dacie, J. V. (1950). *Practical Haematology*. Churchill, London.
 Della Vida, B. L., and Dyke, S. C. (1942). *Lancet*, 2, 275.
 Kaczka, E., Wolf, D. E., and Folkers, K. (1949). *J. Amer. chem. Soc.*, 71, 1514.
 King, E. J., Wootton, I. D. P., Donaldson, R., Sisson, R. B., and MacFarlane, R. G. (1948). *Lancet*, 2, 971.
 Rickes, E. L., Brink, N. G., Koniuszy, F. R., Wood, T. R., and Folkers, K. (1948a). *Science*, 107, 396.
 ——— (1948b). *Ibid.*, 108, 634.
 Smith, E. Lester (1950). *Proc. R. Soc. Med.*, 43, 535.
 ——— (1951). *British Medical Journal*, 1, 151.
 ——— and Parker, L. F. J. (1948). *Biochem. J.*, 43, Proc. viii.
 Ungley, C. C. (1949). *British Medical Journal*, 2, 1370.

TWO CASES OF PERNICIOUS ANAEMIA TREATED WITH VITAMIN B₁₂^d

BY

G. C. K. REID, M.B., Ch.B.

Pathologist, Walsall General Hospital

As described by Lester Smith on page 151, vitamin B₁₂ concentrates produced during the fermentation of *Streptomyces griseus* contain a number of factors having biological properties like those of vitamin B₁₂. It is clearly of importance to know whether a concentrate standardized microbiologically against pure vitamin B₁₂ is of the same therapeutic activity as if it consisted entirely of that substance. To establish this it is necessary to compare all the individual factors with vitamin B₁₂ and to discover whether or not their ratios of human to bacteriological activity are constant.

To further this object two cases of pernicious anaemia were treated with crystalline vitamin B₁₂^d at the Walsall General Hospital. One of these (Case 1) also afforded an opportunity of comparing the potency of this substance with that of a liver extract that had been used on the same patient during a previous admission to hospital.

Case 1

A woman aged 67 was admitted to hospital on October 30, 1948, with the symptoms and physical signs of pernicious anaemia. Laboratory findings were: Hb, 56%; R.B.C., 2,240,000 per c.mm.; C.I., 1.25; M.D.R.C., 8.4 μ (approx.); C.V., 35%; M.C.V., 156 μ^3 ; reticulocytes, 0.8%; W.B.C., 4,800 per c.mm. The blood film showed marked anisocytosis and poikilocytosis. The van den Bergh test gave a positive indirect reaction of 10 mg. per litre. A test meal revealed that no free HCl was present.

On November 3, 1 ml. of "examen" B260A was given intramuscularly: the response obtained completely fulfilled Della Vida's criterion for satisfactory treatment.

The patient made an excellent recovery, and on return home attended the out-patient department regularly until April 7, 1949, when she elected to receive further treatment from her own doctor. However, she did not see him until the middle of July, 1950, when he was called in for the first time and found her extremely ill, being very pale, dyspnoeic, and oedematous. Only then was it discovered that she had had no anti-anaemic treatment for roughly 14 months.

On her readmission to hospital on July 20 she was in a very much worse condition than before, her blood picture being: Hb, 40%; R.B.C., 1,600,000 per c.mm.; C.I., 1.25; reticulocytes 1%. She said that she felt better than she had done a few days previously, and her own doctor, who saw her on the day of admission, confirmed this. With the 1% reticulocyte count and these observations by the patient and her doctor, it was thought that she was in mild remission.

On July 22, 1 ml. (10 μ g.) of vitamin B₁₂^d was given intramuscularly, and she again showed an excellent response to the treatment, although the reticulocytes did not quite reach the expected 20%. This was thought to be due to the fact that she was in remission when the treatment was begun. The increase in red cells slightly exceeded the expected response according to Della Vida's formula (Fig. 1). She recovered well and was discharged from hospital on August 12.

FIG. 1.—Chart of Case 1.

Case 2

A man aged 60 was seen at the out-patient department on June 20, 1950, in an obviously very anaemic condition and with early signs of subacute combined degeneration. The laboratory findings were: Hb, 33%; R.B.C., 1,300,000 per c.mm.; C.I., 1.27; M.D.R.C., 7.8 μ (approx.); C.V., 14%; M.C.V., 108 μ^3 ; W.B.C., 3,800 per c.mm. The van den Bergh test showed a faint positive indirect reaction of 8 mg. per litre. The test meal revealed no free HCl.

FIG. 2.—Chart of Case 2.

On July 31, 1 ml. (10 µg.) of vitamin B₁₂^d was given intramuscularly and an excellent response was obtained, the expected reticulocyte count and the expected red cell total both being reached (Fig. 2). This result again showed that 10 µg. of vitamin B₁₂^d had maximum anti-anaemic-factor activity.

Summary

Two cases of pernicious anaemia have been successfully treated with vitamin B₁₂^d in the very small dosage of 10 µg. Both showed the anti-anaemic activity to be of the same order as that of crystalline vitamin B₁₂.

In one case 10 µg. of vitamin B₁₂^d gave the same response as 1 ml. of examen, having full anti-anaemic activity at that dose level.

The crystalline vitamin B₁₂^d used in the treatment of the two cases described above was supplied by Glaxo Laboratories Ltd., to whom I wish to express my thanks.

MUCUS CATHETERS*

BY

MARK S. FRASER, M.B., Ch.B., M.R.C.P.Ed.
Medical Registrar, Royal Aberdeen Hospital for Sick Children

The removal of mucus from the respiratory passages is a basic step in treating asphyxia of the newborn. Without a clear airway no success can be expected from other methods of resuscitation. Relatively little attention is often paid, however, to the means by which the air-passages are to be cleared. Unsatisfactory instruments are widely used. A review of current methods, especially with reference to the risk of infecting the child, therefore seems overdue.

Historical Notes

Special tubes have long been used for blowing into babies' throats. An early example was Pugh's (1754) air pipe, "made of a small common Wire, turned very close (In the Manner Wire-Springs are made) and covered with thin soft Leather." Chaussier (1785) designed a metal tube for passage into the trachea. Quills and the stems of churchwarden pipes served the same purpose.

During the nineteenth century simple tubes of metal or rubber came into use for preliminary suction also. The chief patterns were the "tracheal pipes" of Blundell (1834) and Chaussier. The unpleasantness of sucking mucus into the mouth was soon recognized but long tolerated. Traps were indeed foreshadowed by Dewees (1825), who wrote, "Might not a properly constructed syringe be highly useful in removing the obstructing mucus?", but no such instrument appeared until 1877. Tarnier then adopted the insufflator, operated by rubber bulb, which bears the name of Ribemont-Dessaignes (1900).

Champneys (1886, 1911) advised that the air-passages be cleared without suction, by tilting the child's head back and blowing into the mouth. The mucus, having gravitated towards the posterior nares, was thus expelled through the nose. "In rare cases," he added, "it may be necessary to pass a catheter into the trachea. If passed 3½ in. (9 cm.) from the lips, it will be below the glottis and above the bifurcation of the bronchi."

The chest should be compressed with one hand and the operator should blow down the catheter, which will cause an up-draught in the trachea and empty it of mucus."

A trap was added to the old tracheal pipe about 1898, when Carton, of Dublin, invented his mucus catheter (FitzGibbon, 1923; no original description traced) with closed end and lateral apertures. Cowell's (1912) design was similar but had a terminal opening. These metal types, with the glass-bulbed patterns which appeared after 1920, remain in common use in Britain. In the United States, De Lee's glass mucus trap has been used for about 50 years.

Methods of Removing Mucus

Drainage by gravity, holding the baby up by the feet, is now considered unwise in cases of severe asphyxia, when intracranial haemorrhage may be present. The blowing method is likely to infect the child. Champneys (1886) himself quoted Reich's account of an outbreak of tuberculous meningitis due to mouth-to-mouth insufflation by a phthisical midwife, and non-tuberculous infection is also important. Suction may be applied by mouth, by rubber bulb, or by a Venturi tube operated by water, by a cylinder of compressed gas (Saher and Salt, 1943), or by electric motor (Roberts, 1949).

The electric and gas-cylinder devices are said to be effective, but are costly and not available in the home. The water suction pump is also confined to institutions and is inconvenient, involving long tubing and usually an assistant to stand by the tap. Excessive negative pressures, which may damage the child, must be guarded against with these instruments. The recoil of a strong rubber bulb produces adequate negative pressure, but the tube must be removed from the throat, probably several times, to renew the vacuum. It is less convenient than mouth-suction.

Of all methods, for convenience, simplicity, and accurate control, mouth-operated mucus catheters are still usually preferred. Their continued use, however, can be recommended only if they are of effective design and properly used.

Essential Features

It is suggested that a mucus catheter must fulfil three conditions.

1. *It Must Have an Efficient Trap.*—Many catheters are not fully protective. Some are too small. In others the inlet is at the bottom of the trap; then, when thin fluid partly fills the space, air is drawn through it and froth is sucked up. One common pattern has no trap but consists of two rubber tubes with a glass connexion of equal diameter. Through this device mucus and meconium often reach the operator's mouth, and it is remarkable that so many doctors and nurses tolerate it. Mucus, as well as being unpleasant, may infect the attendant.

2. *The Tip Must be Soft and Flexible.*—The infant's mucous membrane is easily damaged, and the asphyxiated baby, if livid and hypertonic, or flaccid and lying head downwards on a slope, may lurch suddenly. Rubber tubes should therefore replace those of metal or glass.

3. *It Must Not Infect the Child.*—A mucus catheter which becomes blocked is commonly cleared by blowing

*Based on a paper read before the Scottish Paediatric Society on June 16, 1950.