conjunctivae, result from its repeated use. It may be regarded as a safe method of treatment.

7. No definite correlation between squamous or ulcerative blepharitis and seborrhoea was established.

8. No definite correlation was found between blepharitis and the nutritional standard, and cures were obtained without the use of cod-liver oil and malt. It is important to note, however, that only one case fell into the nutritional category A, and one must also bear in mind the reported excellent results of experimental health meals (Board of Education, 1938).

9. No definite correlation was observed between blepharitis and visual defects.

10. The mild type of the disease was never found to change into the severe type; cases appeared to fall into two quite clearly defined groups.

11. The existence of blepharitis in 1 per cent. of a school population and the great interference with education caused by it demand that some consideration be given to the disease, and particularly to the ulcerative variety.

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CHRONIC ACETANILIDE POISONING

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Sulphaemoglobinaemia as a cause of cyanosis has been recognized for many years and has recently been given prominence on account of the frequency with which it appears in association with sulphonamide therapy. That it may also be produced by antipyretics of the aniline group is not so well known. Snapper (1925) drew attention to the occurrence of cyanosis from sulphaemoglobinaemia following the continued use of aniline antipyretics, and since then several cases demonstrating this toxic effect have been reported. In a paper by Lundsteen, Meulengracht, and Rischel (1938) eleven cases of cyanosis following the administration of acetanilide are described. In one of these cases the authors have demonstrated a coloured derivative of aniline in the blood, and believe that this pigment is largely responsible for the cyanotic appearance of the patient and for the dark colour of the drawn blood, which persists in spite of exposure to the air. It has been recognized for some time that a condition of addiction to the use of acetanilide may develop, and that in individuals who have become thus addicted chronic cyanosis is prone to develop.

The following case illustrates several features which are of interest in view of Lundsteen's findings.

Case Report

A housewife aged 55 was admitted to the Aberdeen Royal Infirmary on account of unexplained cyanosis. Ten days before admission she noticed that her lips were blue; this blueness increased in intensity and her hands became "slate-coloured." The cyanosis was not associated with any other symptom, but she consulted her doctor about it, and he advised her to attend hospital. It transpired that since girlhood the patient had suffered from frequent attacks of right-sided frontal headache, often associated with a sensation of flashing in front of the eyes and followed by vomiting of bile-stained material, which relieved the headaches. In recent years these attacks had become more frequent, and a year ago she consulted a chemist, who gave her powders consisting of acetanilide and phenazone, four grains of each, and caffeine, two grains. These powders relieved the headache and gave her a feeling of well-being, and for the past year she had been taking "about three powders a day." She admitted that the powders "grew on her," and said that when she felt depressed she took a powder, which made her feel better and "things were more cheerful." Shortly before the onset of the cyanosis she had taken considerably more than three powders daily. Her previous history was that, apart from headaches, she had no illnesses. Menstruation had stopped two years previously, and she had since suffered from occasional attacks of flushing.

On examination the patient was seen to be a well-nourished rather stout woman, deeply cyanosed. Her skin was a striking slaty-grey colour, and the cyanosis was especially marked in the lips and mucous membranes. She was afebrile—temperature 98.4°; the pulse rate was 84 and the respirations 20. The pulse was regular, of regular tension, and the arterial wall was soft. The blood pressure was 168/96. The heart was not enlarged and sounds were pure; no murmurs could be detected and there was no evidence of congenital or valvular heart disease. The chest moved equally on both sides; no abnormality of the respiratory sounds or other abnormal physical sign was detected; in particular, no evidence of mediastinal neoplasm was found. The tongue was blue in colour and furred. The throat, apart from the dark colour, was healthy. The abdomen was lax; no tenderness was detected on palpation. No palpable mass was found. The liver and spleen were not enlarged. The pupils were equal, and reacted to light and accommodation. There was no abnormality in the function of the cranial nerves, no loss of power in the limbs, and no sensory impairment. All the tendon reflexes were active and equal. Abdominal and plantar reflexes were normal in type. On examination the fundus of the eye was healthy. Radiological examination of the chest showed no abnormality of heart or lungs.

Laboratory Findings.—The venous blood was dark and remained chocolate-coloured in spite of shaking in a wide-

FIG. 1.—The absorption curves of the blood at the red end of the spectrum: A, on admission; B, after two weeks; C, after four weeks.

mouthed flask with free access to the air. On spectroscopic examination it revealed the presence of an absorption band at the red end of the spectrum occupying the position

615-630 λ . The absorption band did not diminish in density after the addition of ammonia or potassium cyanide. It must therefore be concluded that the pigment responsible for the cyanosis was sulphaemoglobin. There was no anaemia and the leucocytes were normal. Blood examination gave the following result: red cells, 5,100,000 per c.mm.; haemoglobin, 90 per cent.; white cells, 7,400 per c.mm.—polymorphs 58 per cent., lymphocytes 30 per cent., eosinophils 4 per cent., basophils 1 per cent., monocytes 7 per cent. Blood urea was 34 mg. per 100 c.cm., and there was no pathological alteration in the constituents of the urine. The patient remained in hospital for six weeks, and during that time the cyanosis gradually diminished in intensity, as did the density of the abnormal absorption band. Fig. 1 depicts graphically the absorption spectrum of the blood in the red, and shows during the period of hospitalization the diminution in the density of the absorption band associated with lessening of cyanosis. (These graphs are from figures obtained by examining samples of blood of constant dilution with a large-model constant-deviation spectrometer and a Nutting photometer, using the method described by Marshal in his thesis of the University of Aberdeen.)

On discharge the patient was still slightly cyanosed and sulphaemoglobinaemia could still be detected in the blood. The withdrawal of the analgesic powders was not associated with any difficulty or discomfort to the patient. There were no unpleasant subjective effects and no apparent craving.

Comment

The above case is of interest from several points of view. The cyanosis could be entirely explained by the existence of sulphaemoglobinaemia, and it is unnecessary to assume the existence of a coloured derivative of aniline. In the eleven cases described by Meulengracht methaemoglobinaemia was found in one, but spectroscopic data are not given for the others, nor are the details of the spectroscopic analysis described. From the work of Gley (1937) and Campbell and Morgan (1939) the mechanism of formation of sulphaemoglobin from aniline derivatives has now been in some measure explained. It is known that aniline derivatives are oxidized to phenyl-hydroxylamine and *p*-aminophenol in the blood stream, and that both these substances, when added to blood *in vitro*, alter haemoglobin to methaemoglobin; if, however, a trace of hydrogen sulphide is present in the blood the addition of phenyl-hydroxylamine or *p*-aminophenol rapidly forms sulphaemoglobin.

By measuring the absorption of light by a sample of laked blood at 620 λ and 630 λ at given intervals after the

blood alone and to laked blood containing a trace of sulphide. It will be seen that when sulphide is present in the blood the addition of *p*-aminophenol causes rapid conversion of haemoglobin to sulphaemoglobin. In view of this clear-cut property of phenyl-hydroxylamine and *p*-aminophenol (one or both of which are formed from acetanilide in the blood stream) it seems unnecessary to assume the existence of any insoluble coloured derivative of aniline as a cause of the cyanosis unless the presence of such a compound in the blood can be proved beyond doubt.

The tendency to addiction to acetanilide has been emphasized by Lundsteen *et al.* (1938), but since in this case no difficulty was experienced in withdrawing the drug it seems advisable to use the term "habit" rather than "addiction." The genesis of the habit can be readily understood from the fact that the powders were taken for the relief of recurrent headaches, so that a measure of confidence in the remedy, once established, would lead to its repeated use. This tendency was doubtless contributed to by the fact that the powders contained caffeine, a substance which, apart from its effect on headache, has a well-marked stimulant action on the higher centres, and might readily account for the feeling of exhilaration experienced by the patient.

Summary

A case of cyanosis the result of acetanilide poisoning is recorded.

The mechanism of formation of sulphaemoglobin from aniline derivatives is discussed.

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TENDER TEETH: THEIR SURGICAL IMPORTANCE

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Fig. 2.—A: Rate of change of absorption coefficient at 620 λ of a solution of haemoglobin after addition of a weak solution of hydrogen sulphide and *p*-aminophenol. B: Rate of change of absorption coefficient at 620 λ of the same solution of haemoglobin after addition of hydrogen sulphide alone. C: Rate of change of absorption coefficient at 630 λ of the solution of haemoglobin after addition of *p*-aminophenol alone.

addition of suitable reagents it is possible to represent graphically the velocity of alteration in the haemoglobin to sulphaemoglobin or methaemoglobin. Fig. 2 shows the velocity of the formation of methaemoglobin and sulphaemoglobin when *p*-aminophenol is added to laked

The sharp striking pain of toothache is so familiar that it is often used to describe other pains. A dental surgeon is visited and the tooth is usually extracted, which is the end. On the other hand, the tooth which is tender on chewing, clenching the jaws, and percussion, and to hot and cold water, is frequently endured by the patient as the discomfort is so mild, yet just such a tooth may result in serious trouble. It is important to realize that the tenderness may be transitory, being present for only one or two days at a time, reappearing weeks, months, or even years later. The following are some of the more important causes of tender teeth.

Surgical Causes

Cold in the Teeth.—This common condition of acute non-suppurating inflammation of the gum is of unknown origin, and rapidly subsides without treatment. The fact that all the teeth are affected clinches the diagnosis.

Pregnancy and Lactation.—In these conditions the teeth often become tender and carious. The cause is undoubtedly the drain of calcium by the foetus and milk respectively acting on the cementum and teeth, just as Maxwell has conclusively shown is the case with osteomalacia where this occurs in endemic form in Northern China. The remedy would appear to be the administration of vitamin D.