in 1890 claimed that he had isolated an aerobic actinomycete from cases of the disease in cattle; later workers showed that he almost certainly was dealing with a non-pathogenic organism. Infections due to aerobic actinomycetes are known, but in most cases of actinomycosis the micro-aerophilic or anaerobic *A. israeli* can be isolated. This latter organism has never been found free in nature. In addition to its isolation from lesions of the disease it has been obtained by numerous workers from the mouths, carious teeth, gums, and crypts of the tonsils of healthy individuals (Lord, 1933; Emmons, 1936; Slack, 1942). The oral cavity is considered to be the normal habitat of this organism. When certain abnormal conditions arise in the mouth *A. israeli* is thought to alter its habit from a saprophytic to a parasitic state and invade the tissues, giving rise to actinomycosis. It would appear that trauma—for example, the extraction of a tooth—is one factor in precipitating this infection. That there must be others is apparent.

The fact that pieces of grain or grass were often found in actinomycotic lesions was thought to support the theory of Bostroem that the causal organism was aerobic and came from the soil. It is now believed that such foreign bodies act only in their traumatic capacity and allow the *A. israeli*, already in the mouth, to gain access to the tissues.

According to the series of cases presented here there is no doubt that agricultural workers are more often affected than others by actinomycosis. Previous surveys amply support this finding. There is no obvious explanation for this, but an occupational hazard is indicated. The city dweller is not immune from the disease, and it may well be that during a visit to the country or while working in his garden he is exposed to some factor which predisposes to this infection.

Summary

In a restricted area in the north-east of Scotland there occurred 98 cases of actinomycosis in the 13 years from 1936 to 1948. All these cases were confirmed by laboratory examination.

The results suggest that the incidence of actinomycosis is relatively high in this area.

The 98 cases are analysed with particular reference to the age groups affected, sex difference, anatomical distribution, and occupation. The findings are in agreement with previous investigations. The fact that agricultural workers appear to be specially liable to this disease is stressed.

Eight deaths occurred in this series, but there was no death where the infection was limited to the cervico-facial region.

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POTASSIUM BROMATE POISONING

BY

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Potassium bromate poisoning has been recorded only twice in the literature. Carratala and Urcaray (1941) reported one case of grave intoxication, and Dunskey (1947) published a necropsy report on a 17-months-old boy who died after swallowing an unknown quantity of potassium bromate from a neutralizer contained in a "home-perm" outfit. The following case report is presented because similar cases could be expected in view of a claim by manufacturers of home-perm outfits that more than fifty million outfits are sold annually in the United States of America alone. MacKenna (1950a, 1950b) gave a timely outline of treatment.

Case Report

A boy aged 3 found a milk-bottle containing a clear fluid and drank a quarter of its contents. The bottle contained $\frac{1}{2}$ oz. (14.2 g.) of potassium bromate dissolved in one pint (570 ml.) of water, being the neutralizing solution of a home-perm outfit. The child was well until one hour later, when he complained of nausea and vomited. During the next hour he vomited several times and began to look pale. He was given $\frac{1}{2}$ oz. of castor oil, which he vomited immediately, but within half an hour he passed two fluid stools and had much abdominal discomfort. Retching started, and he had a small haematemesis estimated at about half a cupful. It was four hours after swallowing the potassium bromate before medical aid was sought, and he was admitted to hospital two hours later.

On admission the child, a well-developed boy, was unconscious, pale, and flaccid. He could not be roused, but occasionally moved a limb. The pupils reacted to light. Tendon reflexes were absent and the plantar responses were equivocal. The abdomen was soft on palpation. The pulse rate was 100 a minute, regular, but of poor volume; the blood pressure was 85/45 mm. Hg; the heart was not enlarged. Eyeball tension was diminished; the tongue was dry but the skin moist. The axillary temperature was 97° F. (36.1° C.). Respirations were shallow at 30 a minute, and there was acetone in the breath. The fundi were normal.

Gastric lavage was carried out immediately with warm normal saline, and 10 oz. (284 ml.) was left in the stomach. Dextrose 5% in normal saline was given by intravenous drip and warmth applied. After the pulse rate had increased during the next two hours to 160 the intravenous drip was discontinued when 30 oz. (850 ml.) had been given. The axillary temperature and eyeball tension were now normal. Respirations, however, were shallow and rapid, so 1 ml. of nikethamide was given intramuscularly. Soon afterwards the blood pressure rose to 110/65 and the tendon reflexes were elicited. Consciousness was regained three hours after admission.

During the next three days intermittent vomiting continued, but considerable quantities of glucose drinks and warm citrated milk were retained. The child was irritable and pale, and lay with eyes open but remained motionless most of the time. Tachycardia at the rate of 120 a minute remained until the twelfth day after admission. Anuria was present for the first 24 hours, and only a few millilitres were passed on the second day. On the third day 6 oz. (170 ml.) was passed, and subsequently quantities were normal. Albuminuria, at first 6 g. per litre, diminished, but did not disappear until the seventh day. No casts or other

abnormal constituents were present except acetone on the second day.

On the seventh day after admission the child smiled, took an active interest in his surroundings, and accepted a semi-solid diet. Convalescence was uneventful, and he was discharged after 17 days in hospital. Review at intervals during the next month revealed no abnormality, though his mother stated that he was fretful and irritable at home. Tests for bromate in the urine on the third day were negative.

Discussion

Goodman and Gilman (1941) state that bromides depress the activity of the nervous system but have little effect on the kidneys or other tissues. However, bromates which do not release the ionic form do not possess the actions of the ionizable bromide salts. Bromates are only partly reduced in the tissues, and, according to Santesson and Wickberg (1913), are toxic to animals, producing among other features apathy, vomiting, diarrhoea, and depression of the central nervous system, particularly the respiratory centre. These workers also noted conspicuous changes in the kidneys, especially tubular degeneration. Some of these features were noted in our patient.

The toxic effects in the patient described by Dunskey (1947) were similar to those in this boy, but his patient developed anuria, which persisted with convulsions until death. Necropsy revealed gross tubular damage in the kidneys. Other findings were hepatitis, pulmonary oedema, and toxic myocarditis.

It is estimated that this boy swallowed 60 gr. (4 g.) of potassium bromate, but no evidence is available of the amount consumed in the other cases.

We asked the manufacturers of the home hair-waving outfit for information about recommended methods of treating poisoning caused by accidental swallowing of neutralizing solution, and they obtained the following guide from their New York headquarters:—(1) Emetic: (a) teaspoonful of mustard powder in glassful of warm water, or (b) zinc sulphate, half teaspoonful in warm water followed by copious drinks of water, or (c) apomorphine, 5 mg. intramuscularly, and/or (d) wash out the stomach with stomach tube. (2) Sodium thiosulphate (hypo)—one level teaspoonful in water. This may precede but should follow the emetic. (3) Demulcent drinks such as milk, flour and water, or cereal gruel. (4) If shock is present, treat for shock, but avoid central nervous stimulants. (5) For pain (gastritis) give morphine, 15 mg. subcutaneously. Dose for children 5 mg. or more, depending on age and weight. (6) Sodium thiosulphate solution 1% intravenously by drip, 100 to 500 ml. If not feasible, give 10 to 50 ml. of a 10% solution.

Investigation in this hospital has shown that, after incubation of normal gastric juice at 38° C. with potassium bromate for periods of up to three days, no bromide or bromine was released. Bromine was not liberated in acid solution unless the pH was below 1. This agrees with other experimental evidence that bromate is absorbed unchanged. The bromate used by the manufacturers of the home-perm sets showed no evidence of bromide contamination.

In the presence of dilute HCl and thiosulphate some bromate is reduced to bromide, but in addition there is some reduction of thiosulphate to sulphide, which is in itself a powerful irritant and toxic agent. For this reason oral administration of thiosulphate is not advised.

We would criticize the use of apomorphine, as vomiting is severe in established cases, and suggest that stimulants such as nikethamide may be required when the respiratory centre is depressed. Fluids should be given if necessary intravenously when vomiting is protracted.

Immediate evacuation of stomach contents and gastric lavage with normal saline are of the utmost value, as we have information that when small quantities have been consumed and an emetic was given speedily no toxicity was observed.

Summary

The patient here described was a child of 3 years who had swallowed about a quarter of a pint of a solution of potassium bromate—60 gr. (4 g.)—used as a neutralizer in a "home-perm" outfit. The child was very ill for some days, but was discharged from hospital completely recovered 17 days after admission. Emergency treatment should include emptying of the stomach and gastric lavage with normal saline.

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PREGNANCY PROLONGED BEYOND THE EXPECTED DATE

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The term "post-maturity" has purposely been avoided in the title of this article, as it implies that this state is pathological.

It is generally agreed that the baby born at term (after 40 weeks' gestation) has the best chance of survival. It is also generally supposed that with post-mature babies, as with premature babies, there is an increased mortality. To many people, therefore, it seems that labour should be induced as soon as the pregnancy becomes post-mature; and there is evidence of a growing tendency for such induction to be performed by many obstetricians. Mills (1950) states that he induces labour in all cases in which pregnancy goes ten days beyond the expected date of delivery. Malpas (1950) says that he advises induction if the patient goes three days beyond the expected date of delivery. That these policies are not always justifiable will be obvious from the following considerations.

The duration of pregnancy varies considerably in humans, and, as in all biological measurement, there is an expected variation on each side of the "mean." With regard to the size of the baby, there is also variation: it is stated in standard textbooks that a baby at term may weigh anything from 5 to 10 lb. (2.3 to 4.5 kg.). It is also known that in women with long menstrual cycles pregnancy tends to become post-mature. For these reasons alone a cut-and-dried policy of routine induction at ten days, or at any other precise period after the