erupted teeth contain two structures which differ in biochemical nature; one is a mucoprotein.

Enamel at eruption is covered with a layer of protein, and is permeated with protein throughout life. Enamel protein is a mucoprotein, which comprises a class of proteins containing mucoitin sulphuric acid.

Dentine contains chondroitin sulphuric acid.

Gram-negative bacilli found in caries can release an enzyme—sulphatase.

Sulphatase can release sulphuric acid from such combined forms as mucoitin sulphuric acid and chondroitin sulphuric acid, thus attacking the calcium salts of both enamel and dentine and causing caries.

To my colleagues at the hospital and to the Medical Research Council, which has provided financial facilities, I wish to express my indebtedness.

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A CASE OF PSITTACOSIS TREATED WITH PENICILLIN

BY

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The purpose of this note is to report the case of a patient infected with psittacosis who responded to treatment with penicillin.

Case History

A medical research worker aged 43 was admitted to hospital on Sept. 14, 1948. His work during the previous three months had involved the handling of material obtained from mice infected with psittacosis virus.

Two weeks before admission he had developed severe coryza. Six days later (eight days before admission) he suffered the sudden onset of marked malaise, shivering, and high fever (temperature 103° F.—39.4° C.) associated with severe headache and vomiting. He went to bed, and the symptoms persisted unchanged for 48 hours. Then they suddenly abated, and for 12 hours he felt much better. But five days before admission fever, rigors, headache, and vomiting returned; anorexia was complete; both mental and physical prostration soon became marked features; and he slept poorly or not at all. He developed a slight cough producing only scanty sputum. The day before admission he developed a sore throat.

On admission to hospital he looked seriously ill, with pale complexion, sunken eyes, and hollow cheeks. His lips were crusted with sordes, and his tongue was dry, brown, and furred. He was not dyspnoeic, and lay flat in bed without distress. His temperature was 99° F. (37.2° C.), pulse 80, and respirations 22. The fauces and tonsils were injected but no exudate

was seen. The right tonsillar gland was enlarged and tender, but other lymphatic glands were normal. Bronchial breath sounds were audible in scattered areas over the right lung base posteriorly, and there were crepitations on inspiration in this area. The cardiovascular system was normal and the blood pressure 100/70 mm. Hg; the spleen was not enlarged. The central nervous system was normal except for the profound mental prostration. Questions were answered reluctantly, slowly, and with difficulty, but the answers were nevertheless clear and not confused.

Laboratory Investigations.—On Sept. 14 a radiograph of the chest revealed loss of translucency in the right lower zone, suggesting an inflammatory lesion. A psittacosis complement-fixation test was positive to a titre of 1/64. The titre rose to the level of 1/256 on Sept. 27. Blood culture was sterile aerobically and anaerobically. A throat swab revealed no haemolytic streptococci, diphtheria bacilli, or Vincent's organisms. On Sept. 15 a blood count showed: Hb, 89%; white cells, 5,400 per c.mm. (polymorphs 84%, eosinophils 1%, lymphocytes 10%, large hyalines 5%). Sputum contained many bacteria and some monilia, but no virus was seen. On Sept. 21 a radiograph of the chest showed that the lower zone of the right lung field had cleared. An irregular opacity was apparent in the left mid-zone. On Sept. 27 the lung fields were clear.

Treatment.—The history of exposure and the clinical features of the illness made the diagnosis of psittacosis certain enough to justify treatment before laboratory confirmation was available. Apart from penicillin, the only drugs used were analgesics to relieve headache and sedatives to ensure sleep. Each dose of penicillin was mixed with 1 ml. of 2% procaine to reduce the discomfort of the injection. Penicillin therapy was started in the patient's home on Sept. 13, seven days after the onset of the illness. On that day 1,200,000 units were given in three doses. On Sept. 14, the day of admission, one dose of 500,000 units and one of 1,000,000 units were given. Thereafter 1,000,000 units of penicillin were injected twice daily for four and a half days. The drug was discontinued on Sept. 19, the patient by then having received a total of 11,700,000 units.

The response to treatment was most satisfying. On Sept. 16, ten days after the onset of the illness and 72 hours after the initiation of penicillin therapy, the patient was completely apyrexial (see Chart), his mental processes were noticeably

clearer, and he was sleeping well. Next day the signs of consolidation at the base of the right lung were still present, and in addition there was clinical evidence of left basal pneumonia. These fresh pulmonary findings were not, however, accompanied by further symptoms or constitutional upset. On Sept. 19 treatment with penicillin was discontinued. On Sept. 21 a radiograph of the chest confirmed the clinical findings by showing diffuse shadowing at the left mid-zone, suggesting an inflammatory process. But by now the right base showed considerable clearing radiologically. Clinical improvement was rapid, and on Sept. 27 the lungs were normal both clinically and radiologically.

The patient was discharged, symptom-free, on Oct. 1, 25 days after the onset of the illness, and 17 days after admission to hospital.

Comment

A patient suffering from a severe attack of psittacosis is usually ill for between two and four weeks. Prognosis is difficult to assess, but the outlook is better in the young than in the old, and extensive pulmonary involvement tends to carry a high mortality. In the patient under consideration penicillin therapy was started seven days after the onset, and complete defervescence had occurred 72 hours later. In view of the severity of his illness it seemed reasonable to attribute the satisfactory response to the treatment he received.

Reported cases of human psittacosis treated with penicillin are few. Parker (1945) published details of two such patients. In the first, a woman of 61, treatment with intramuscular penicillin in a dosage of 120,000 units daily was started on the nineteenth day of the illness, and the patient had become apyrexial on the twenty-first day. The second patient was a woman of 52 who received 160,000 units of penicillin daily from the thirteenth day. She was afebrile on the sixteenth day. In the same year Flippin, Gaydosh, and Fittipoldi (1945) treated a man of 53 with 100,000 units of penicillin daily after he had been ill for 19 days. On the twenty-second day great improvement was shown. However, since in these three patients the drug was given late in the disease, when spontaneous recovery might have been expected, the improvement which followed the administration of penicillin cannot conclusively be attributed to this treatment.

In the case of a patient aged 43 reported by Turgasen (1944) a daily dosage of 100,000 units of penicillin was begun on the fifth day of the illness. But the response was not dramatic, for the patient's high fever persisted for five days after the initiation of treatment. Rosebury *et al.* (1947) reported the treatment of a man aged 41 with both penicillin and sulphadiazine: 400,000 units of penicillin were given daily from the fourth to the fourteenth day of the illness, and 6 g. of sulphadiazine was given daily from the fifth to the twelfth day. The patient became apyrexial, and marked clinical improvement was shown as early as the sixth day, after he had received 800,000 units of penicillin and only 4 g. of sulphadiazine. The dosage of sulphadiazine here seems too small for this drug to have been of major therapeutic value, and the satisfactory response must therefore probably be attributed to the penicillin.

Wolins (1948) reported six patients suffering from psittacosis, only one of whom could be considered severely ill. Four of them responded satisfactorily, though not dramatically, to 400,000 units of penicillin daily. The same dose of penicillin had little effect on the course of the illness in the remaining two. Wolins pointed out that two of the four patients who responded well to penicillin had earlier failed to improve on a smaller dose (200,000 units daily).

In contrast with the clinical evidence there is good experimental evidence that infection of the mouse with psittacosis virus can be controlled by penicillin. Heilman and Herrell (1944) infected 104 mice with psittacosis virus and treated half of them with very large doses of penicillin (1,000 units daily), the remainder acting as controls. All the controls died, whereas the mortality in the treated mice was only 8%. This finding was confirmed by Bedson and May (1945), who also showed that the minimum dosage of penicillin necessary to protect a mouse from a lethal infection

was 800 units a day for four days. This again is a very large dose, and suggests that, if one may argue from mouse to man, the total dosage of penicillin needed to treat a human case of psittacosis would be about 11,000,000 units. The treatment of the case reported above was of this order.

It may be that the two most recent antibiotics, chloramphenicol and "aureomycin," which are effective against viruses of the psittacosis-lymphogranuloma group (Smadel and Jackson, 1947; Wright *et al.*, 1948), will prove more useful than penicillin. They have the added advantage that they can be given by mouth. However, neither is as yet available in this country, and in the meantime the encouraging result obtained in the case described here suggests that penicillin is well worthy of further trial in the treatment of psittacosis in man. It seems likely, however, that the dosage should always be massive; and if 2,000,000 units daily should prove ineffective an even higher dose should be considered.

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A CASE OF MONOCYTIC LEUKAEMIA TREATED WITH AMINOPTERIN

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The acceleration of the leukaemic process produced by folic acid led to the search for antagonists which might favourably influence the disease. The most potent compound so far reported is "aminopterin" (4-aminopteroyl-glutamic acid), though others with similar properties have lately been used. It is effective in doses of 0.5–1 mg. daily in children and up to 4 mg. daily in adults. It causes a general depression of bone-marrow function and has toxic effects at therapeutic dosage which seriously limit its usefulness. It can be given by intramuscular injection, but is equally effective by mouth. In the case reported below none was available for oral administration.

Case Report

An obese man aged 30, who was subject to spasmodic bronchitis severe enough to warrant grading C2 in the Army, presented with a six-weeks history of furunculosis and stomatitis. For six months he had been listless and unduly fatigued. The stomatitis consisted of a boggy hypertrophy of the gums and hard palate. There was no bleeding, but the mouth was very painful. Neither spleen, liver, nor lymph glands could be felt to be enlarged. There was an irregular fever; the patient was anaemic, and Hess's test for capillary fragility was positive. A blood count showed: white cells 32,400 per c.mm. (monocytes