Two days after admission his condition grew worse: consciousness was clouded, the pulse 130, and respirations rapid and shallow. The bubo was larger, and inflammatory oedema extended from the middle of the thigh to the umbilicus. He was given 300 mg. of streptomycin every three hours, but 24 hours later his condition was still serious. Although his temperature had dropped to 38° C. his pulse became thready, his finger-tips bluish, and he was dyspnoeic. On July 23 there was a marked general improvement. The patient felt much better, his pulse rate was 92, he was no longer dyspnoeic, and he was on the way to recovery. Streptomycin was continued until July 27. The bubo was still painful, but the abdominal oedema had subsided. On August 16 fluctuations became evident and a thick purulent discharge was evacuated. The final healing of the wound was delayed until Sept. 9, but the patient felt very well until his discharge.

Summary

Streptomycin treatment of three very severe cases of plague not responding to sulphonamides resulted in speedy recovery. A fourth severe case was not treated with streptomycin, and the patient died on the eighth day of his illness.

Whereas the effect of streptomycin on the general condition of the patients was remarkably good, the buboes appeared to be uninfluenced if treated late. This was true also in respect of the sulphonamides, and in most cases incision and drainage were necessary to bring about resolution.

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SOLITARY MYELOMA OF THE MANDIBLE

BY

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The myeloma, or plasmacytoma, is a tumour of plasma cells which usually produces multiple lesions, causing a systemic affection of the body. As distinct from generalized myelomatosis of bone, the solitary myeloma is not uncommon in the nasopharynx and in single bones such as a vertebra or clavicle. Very few references, however, can be found on lesions of the jaw affected by the solitary type of myeloma.

William Tennent (1945) in a survey of 49 cases does not mention a single tumour of the mandible. No reference to the mandible as a site of myeloma is found in Beattie and Dickson's *Textbook of Pathology*. Because of the paucity of information existing in the literature concerning the solitary myeloma of the mandible the following case is recorded.

Case History

A man aged 39 was referred to one of us (R.S.) because of persistent swelling and great pain in the left side of the mandible. He gave a history of pain persisting for three weeks, at first localized in one of the left lower bicuspid and accompanied in the later stages by a slight swelling of the cheek. The tooth was first treated conservatively, but as no relief was obtained it was eventually extracted. The wound failed to heal and pain persisted, with discharge of pus from the socket. A little later the pain assumed a constant and dull character with attacks radiating to the ear and temporal region. These symptoms were accompanied by general malaise.

Inspection of the lower jaw revealed an oedematous inflamed mucous membrane extending from the canine to the molar region on the left side. Pus was draining freely from the wide-open socket of the extracted bicuspid tooth. The wound edges

were lacerated and undermined, and the base was covered with greyish granulations. There was some swelling of the buccal aspect of the mandible, but the lower border was palpable and no fluctuation was present. The process had involved the regional lymph nodes, causing hard and tender nodules, paresis of the left side of the lower lip, and slight trismus.

A lesion measuring 11 mm. in diameter was present in the region of the previously extracted bicuspid tooth. This was of osteolytic character without sharp definition and with little trabeculation. There was no evidence of the presence of root fragments or sequestra. On the strength of the clinical picture and the radiological appearance (Figs. 1 and 2) a tentative diagnosis of osteomyelitis was made and surgical exposure advised.

FIG. 1

FIG. 2

At operation a large mass of soft granulations of maroon colour which bled freely on manipulation was found in the affected area, extending into and invading the mental foramen and the mandibular canal. It was thus found that encroachment upon the cortex and marrow of the bone of the mandible was far greater than had been suspected from the clinical picture. After thorough curetting of the bone cavity a specimen was taken for histological examination. The biopsy showed a true myeloma. No Bence-Jones proteins were found in the urine. A blood count showed: red cells, 5,000,000 per c.mm.; haemoglobin 88%; oxyhaemoglobin 12.1 g.; white cells, 6,500 per c.mm.

Histology of Tissue from Mandible.—The histology was that of a plasmacytoma, or true myeloma of bone marrow (Fig. 3).

FIG. 3

The material received consisted partly of necrotic bone, the cancellous spaces of which contained collagen fibres, fibroblasts, lymphocytes, and polymorphonuclear leucocytes. There was thus evidence of chronic osteomyelitis associated with tumour formation. Critical examination of the plasma cells which constituted the neoplasm revealed the presence of mitotic figures and of hyperchromatic nuclei in moderate numbers. The identity

of the plasma cells was confirmed by staining with Unna and Pappenheim's methyl-green and pyronine. It is to be noted that this tumour bears no relationship to the myeloid epulis or osteoclastoma.

The diagnosis of solitary myeloma having been established, the patient was referred for x-ray therapy to Dr. Phillip Flood, to whom we are indebted for co-operation with this treatment and for furnishing notes on the clinical progress of the case.

Conclusion

The myeloma is a true malignant neoplasm, which in this case proved responsible for the pain which had at first been attributed to simple toothache. Several theories have been advanced regarding the aetiology of these tumours. Trauma and chronic osteitis may have an influence on the malignant transformation of cells of the bone marrow. In the present case the histology reveals that an osteitic process can be traced in the tumour region. Such a deviation from the normal may have contributed to the formation of the growth. A thorough radiological examination did not reveal any metastatic tumours. The treatment of choice for plasmacytomata in this region is surgical removal followed by x-ray therapy (Gootnick, 1945).

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SIGNIFICANCE OF THE GRAM TEST FOR BACTERIA IN RELATION TO PENICILLIN BACTERIOSTASIS

BY

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We have already shown that nucleic acids possess the property of antagonizing the inhibitory action of penicillin on susceptible pathogens and that they can also reverse such actions (Pandalai and George, 1947a, 1947b). Further, nucleic acids restored original characteristics to bacterial cells which had undergone changes in morphology and Gram-staining reaction due to contact with penicillin. We also demonstrated that nucleic acids failed to have any of these effects on Gram-negative bacteria, such as *Bacterium coli*, normally insensitive to penicillin, but which, however, were inhibited by higher concentrations (George and Pandalai, 1947).

It is now known that some other antibiotics are Gram-sensitive. It has also been demonstrated (Henry and Stacey, 1943, 1946) that the staining quality characteristic of the Gram-positive organism is associated with the presence of magnesium ribonucleate within the organism, and that this substance prepared from commercial sources was capable of restoring the Gram-positive quality to bacteria from which it had been removed by 2% bile salt in normal saline.

We have studied the influence of added magnesium ribonucleate on the growth of Gram-negative organisms kept in contact with penicillin. It might be expected that in the presence of added magnesium ribonucleate the Gram-negative organisms which are ordinarily insensitive to

penicillin would in their life processes be more in agreement with the sensitive organisms, and consequently would be inhibited by lower concentrations of the drug. It was actually found that magnesium ribonucleate stood to the Gram-negative organisms in just the same relation that nucleic acid stood to the Gram-positive organisms, in that it antagonized the inhibitory action of penicillin and also allowed the organisms to grow from a non-viable condition produced by contact with penicillin. The results are given in Tables I and II.

TABLE I.—Showing the Influence of Magnesium Ribonucleate on the Penicillin Inhibition of *Bact. coli*

Penicillin Alone (Units per ml.)	Magnesium Ribonucleate Alone	Magnesium Ribonucleate and Penicillin	Broth Control
12.0 +	1/2,500 +++	1/2,500 { 12.0 ++ 15.0 ++ 17.5 ++	
15.0 —	1/5,000 +++	1/5,000 { 12.0 ++ 15.0 ++ 17.5 +	+++
17.5 —	1/10,000 +++	1/10,000 { 12.0 ++ 15.0 + 17.5 +	

— indicates complete inhibition; + indicates growth; ++ fairly good growth; +++ very good growth.

TABLE II.—Showing the Reversibility of Penicillin Action on *Bact. coli* produced by added Magnesium Ribonucleate

Penicillin (Units per ml.)	Magnesium Ribonucleate Added			Broth Control
	After 3 Hours	After 6 Hours	After 24 Hours	
12.0 +	++	++	++	
15.0 —	++	++	++	
17.5 —	++	++	++	
20.0 —	++	++	++	+++

The magnesium ribonucleate used was a neutral solution of the magnesium salt of pure yeast nucleic acid, and *Bact. coli* was the test organism. The results show, however, that the addition of magnesium ribonucleate to *Bact. coli* cultures does not help the organisms to become susceptible to lower concentrations of penicillin. This means that magnesium ribonucleate alone cannot convert the Gram-negative organism into a Gram-positive one, at any rate from the point of view of susceptibility to penicillin action. Even, granting that magnesium ribonucleate has some far-reaching effects on an organism (Stacey, 1947) in its relation to the Gram test, it cannot be said to possess any special influence on the specificity of the inhibitory action of penicillin, as the susceptibility of certain organisms, such as *Streptococcus faecalis*, the gonococci, and the meningococci, will still remain unexplained.

That the magnesium ions, quite apart from the ribonucleate moiety, in the magnesium ribonucleate exert a pronounced influence on the growth of *Bact. coli* in contact with penicillin is seen from the results given in Table III.

TABLE III.—Showing the Influence of Magnesium Ions on the Growth of *Bact. coli* in the Presence and Absence of Penicillin

Penicillin Alone (Units per ml.)	Mg ++ Added as MgSO ₄ Solution Alone	MgSO ₄ and Penicillin	Broth Control
6.0 ++ 8.0 ++ 10.0 ++ 12.0 + 15.0 — 17.5 —	0.1% +++ 0.2% +++	0.1% { 6 ++ 8 ± 10 — 12 — 15 — 0.2% { 6 ++ 8 ± 10 — 12 — 15 —	+++