TABLE II

	1948		1949		1950		1951	
	New Cases	Re-lapses	New Cases	Re-lapses	New Cases	Re-lapses	New Cases	Re-lapses
Cases of clinical malaria ..	472	1,302	1,175	429	1,465	977	1,486	175
% relapses to new cases ..	275.8		36.5		66.7		11.8	
No. attending at clinic ..	14,279		19,196		26,586		19,504	
No. of blood films examined ..	2,459		1,791		1,756		2,879	

Discussion

Hookworm has been especially mentioned, as it is believed to be the main cause, but whipworm has been present in most of the infested cases, and occasionally roundworm; tapeworm not at all. The hookworm infestation rate in this area is in the region of 80%.

When attached to the gut wall the hookworm is known to inject an anticoagulant into the blood stream to prevent clotting while obtaining blood. It is possible that either this anticoagulant or some other unknown substance injected at the same time has the effect of preventing the action of antimalarial drugs. It seems unlikely that the hookworm acts by absorbing the drugs while they are still in the intestine, because mepacrine and quinine when given by injection have also often failed to act until the hookworm treatment has been given.

It is possible that the hookworm treatment causes the hookworms to release their hold on the intestine, and their products may be destroyed or be eliminated from the body. The antimalarial drugs may then exert their effect before the surviving hookworms are able to regain their position and activity.

Medical Memorandum

Generalized Actinomycosis with Possible Cardiac Involvement

Actinomycosis is not uncommon in the classical sites, but general dissemination is infrequent and endocardial involvement rare. Cornell and Shookoff (1944) found only 18 reported cases with endocardial ulceration capable of causing pyaemia. In only two were valves infected; the remainder arose by direct spread from the mediastinum (11) or by embolic involvement of the myocardium (5). One of their personal cases, a clinical mitral lesion, violates any pre-mortem diagnosis of an actinomycotic valve infection: the valves were normal at necropsy, but granulation tissue had penetrated the auricle from the mediastinum.

Localized lesions usually yield *Actinomyces bovis*, a non-acid-fast anaerobe. The acid-fast aerobic organisms are pathologically less common, but more often cause generalized spread (Cope, 1938). Cases recently reported incriminate members of this group (Custis *et al.*, 1944; MacNeal *et al.*, 1946; Stokes *et al.*, 1951).

A case is reported below in which general dissemination was due to *A. bovis* of probable endocardial origin. Prolonged penicillin therapy resulted in apparent cure.

CASE REPORT

An apprentice joiner aged 18 was admitted on December 20, 1950. Eight months previously he had a left facial palsy following an injury to the homolateral mastoid region, the site of mastoidectomy at the age of 6. Lassitude, weight loss, and stabbing pains deep to the xiphisternum on bending forward and local pressure then started. Three-day periods of discomfort in the same situation were accompanied by dyspnoea on exertion. Later, "cramps" in his calves on walking preceded the appearance of tender swellings.

Examination revealed a harsh aortic systolic murmur with a split second sound and accentuated pulmonary second sound. Discrete, tender, subcutaneous swellings 2 to 4 cm. in diameter were present in the calves and thighs—some fluctuant, others firm. The feet were plantar-flexed, and dorsiflexion caused pain. Knee movements were similarly limited. Diagnosis was not aided by numerous investigations. A blood culture yielded a spore-bearing organism rejected as a contaminant. An x-ray film of the chest showed equivocal opacities at the right base; the posterior mediastinum was seen to be clear. Biopsy revealed non-specific lymphocyte infiltration and fibroblastic reaction.

The temperature ranged from 98 to 100° F. (36.7 to 37.8° C.), and the pulse 100 to 110. Bacterial endocarditis (organism not known) was diagnosed and penicillin, 250,000 units four-hourly, was administered for seven weeks. The temperature settled in six days, but the tachycardia persisted until the sixth week, when the spleen was palpable for a few days. Pain, tenderness, and the abnormal heart sounds disappeared, though some nodules persisted. For the next six weeks he remained well, but new lesions developed on the legs and forearms.

In April, 1951, the patient was admitted to the Manchester Royal Infirmary. Both firm and fluctuant nodules were present on the arms and legs; the calves felt woody. There was no fever, splenomegaly, or cardiac abnormality. *A. bovis* was isolated from a fluctuant lesion, and microscopy of the faeces showed many morphologically similar organisms. An x-ray film of the chest remained equivocal. Penicillin ("distaquaine"), 600,000 units eight-hourly, was given for 16 days, and then once daily for two months. All lesions gradually subsided. In September, 1952, he was well; an x-ray film of the chest showed no change, and there were no actinomycetes in the faeces.

DISCUSSION

The varying cardiac bruits suggested the endocardium as the focus for pyaemic spread. Whether it was on the valves, or whether it was on the mural endocardium as described by Cornell and Shookoff, could not be decided. The lungs were an unlikely focus for dissemination. The faecal actinomycetes and retrosternal pain indicated a primary oesophageal lesion, possibly spreading to involve the endocardium. The absence of mastoid inflammation made it an unlikely focus for a blood-borne endocardial infection. The fresh lesions after the disappearance of cardiac signs may have been due to the slow growth of deposits already in the tissues and not to the persistence of the cardiac focus.

Penicillin therapy should be prolonged in systemic actinomycetes infections; with small dosage, up to nine months has been necessary (MacNeal *et al.*). Chloramphenicol, however, has proved successful after four weeks in an *Actinomyces muris* infection (Stokes *et al.*). The present case suggests that with the current large doses of penicillin at least three months' treatment is necessary, though one daily injection of a long-acting product may be enough after the first month.

Finally, in a case of doubtful pyaemia an unusual spore-bearing organism from blood culture should not be lightly disregarded as a contaminant.

Our thanks are due to Professor T. H. Oliver for his kind co-operation and to the Department of Clinical Pathology, Manchester Royal Infirmary.

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