

senescing, galled and mosaic-diseased leaves all have something in common for the aphids.

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A New Type of Pathogenic Mycobacterium

IN 1948 skin lesions due to a new acid-fast organism, *Mycobacterium ulcerans*, were reported from Australia¹. The lesions were swarming with bacilli; but no growth was obtained on media incubated at 37° C. Culture at 33° C. gave growth.

Some seventy cases of a rather chronic, papulous, cutaneous disease producing ulcerations, which may be due to another acid-fast organism likewise not growing at 37° but at 31° C., have been observed in the past few years at Örebro, Sweden. The lesions were usually localized to the elbows. Some of the patients reported that they had scratched the elbow in a swimming pool two to three weeks earlier. The disease always healed within six months to two years, even when left untreated.

We examined histologically the lesions from thirty patients with this disease. Tubercloid granulation tissue was almost always found. In one case a few acid-fast organisms were observed inside the lesion. Lesions from twenty patients were examined bacteriologically. In three cases acid-fast organisms growing at 31° C. were isolated. Large yellowish-white colonies appeared on Löwenstein medium. The colonies were flat with a central nipple. The growth obtained when the glycerine concentration was 0.5–10.0 per cent was good, but when glycerine was omitted from the medium it was poor. Incubation at 31° C. gave growth after 8–10 days; at 22° C. growth usually required three weeks. Culture at 37° C., even with prolonged incubation, gave no growth. The bacilli were Gram-positive and strongly acid-fast. They were not sensitive to *para*-aminosalicylic acid in experiments kindly carried out by Prof. J. Lehmann (Gothenburg).

Material was then collected from the swimming pool and examined. Organisms with the same characteristics as the bacilli isolated from the three human cases were found in scrapings from the cemented wall of the pool and in samples of the water.

The pathogenic properties of the acid-fast bacilli isolated were studied experimentally in animals. The organisms were found to be only slightly pathogenic for guinea pigs; large intraperitoneal injections occasionally gave localized abscesses in the scrotum. Papulous lesions showing the same microscopic changes as the human lesions were reproduced in the skin of rabbits by infecting ulcerations, produced by rubbing the shaved skin with sandpaper, with a suspension of organisms. Following intraperitoneal, and sometimes also intravenous, injections of bacilli into male rabbits, granulomatous inflammation with

caseous necrosis was found in the scrotum. The lesions contained a few acid-fast organisms.

Most white mice infected intraperitoneally became seriously ill and died. Abscesses and ulcerations appeared on the tail, the paws and the scrotum. Widespread lesions were frequently found in the internal organs, especially in the lungs, which showed numerous caseous patches. The lesions produced in the mice contained enormous masses of acid-fast bacilli. Amyloidosis of the liver, spleen and kidneys was frequently observed. After several months of illness a few of the mice seemed to show signs of recovery.

Rats infected intraperitoneally showed no signs of disease; but on microscopic examination numerous tubercloid structures were found in the omentum and sometimes in the hilar lymph nodes. The lesions contained many acid-fast bacilli. Intravenous or intraperitoneal injection of the bacilli into chickens produced no lesions. The effect of such injections on other animals is being studied.

Guinea pigs and rabbits infected by intraperitoneal injection were tested intradermally with tuberculin (Tuberculin P.P.D. kindly supplied by Dr. K. Tønderlund, of the State Serum Institute, Copenhagen). No reactions to a dose of 5,000 tuberculin units were observed in guinea pigs followed up for three months. Some rabbits gave definite reactions to a dose of 500 tuberculin units six to seven weeks after the injection of the bacilli.

A suspension of autoclaved bacilli was injected intradermally into three tuberculin-positive human volunteers. After forty-eight hours, there appeared skin reactions similar to those obtainable with tuberculin. Later, these lesions became necrotic. Microscopic examination showed the presence of tubercloid granulations.

Judging by the behaviour of the bacillus, it seems to be a hitherto undescribed type of pathogenic *Mycobacterium*. It is probably not identical with *Mycobacterium ulcerans*. Dr. G. Buckle (Australia) was kind enough to place at our disposal cultures of *Mycobacterium ulcerans*. The bacteria under discussion were found to differ from the Australian bacilli as regards both growth on artificial media and their effect on experimental animals.

Cases of tubercloid skin granuloma caused by atypical acid-fast bacilli have been reported from Sweden^{2,3}. The histological picture resembled that of the lesions seen in our patients. In the less advanced cases, however, numerous rather thick, acid-fast bacilli were seen in the lesions. Culture at 37°, 31° and 24° C. showed no growth⁴. This may therefore be a disease differing from the one observed by us. Tubercloid skin-granuloma after swimming-pool accidents have been reported elsewhere^{5,6}, and it is possible that further investigations will show that such skin lesions are also due to acid-fast organisms similar to those described above.

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