mallei (4 strains), and *Pasteurella pestis* (5 strains).

In liquid medium studies, blood-free medium and Snyder's peptone broth (Snyder *et al.*, Proc. Soc. Exptl. Biol. Med., **63,** 26, 1946) were prepared in 100 ml volumes in 250-ml Erlenmeyer flasks. Inocula were obtained from a 72 hr old culture in Snyder broth. These cultures were incubated on a Brunswick rotary shaker (200 cpm through a diameter of 1 in) housed in a thermostatically controlled cabinet at 35 C. Figure 1 illustrates typical comparative growth curves for the Schu and the Canadian water strains of *P. tularensis*. When small inocula were employed, growth was not obtained in the Snyder medium. However, when the concentration of the inoculum was in excess of 2×10^6 viable cells per ml, the rate and extent of growth was comparable in both media.

The virulence of *P. tularensis* for mice by intraperitoneal inoculation was less than 10 viable cells for organisms grown in either of the media. Accordingly, it is believed that the above described blood-free medium offers several advantages over earlier media. These include more precise chemical definition, ease of preparation, enhanced growth from small inocula and nondependence on blood.

SPORULATION BY TWO STRAINS OF *NOCARDIA ASTEROIDES*[1]

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In a study (Gordon and Mihm, J. Bacteriol., **73,** 15, 1957) of 79 strains of *Nocardia asteroides*, it was reported that all the strains formed aerial hyphae and that the aerial hyphae of 26 per cent of the strains divided into chains of spores. The spores were even and beadlike and, under the magnification used (430 ×), could not be differentiated from those formed by strains received as Streptomyces.

Electron micrographs of the aerial hyphae of two strains of *N. asteroides* (figures 1 to 4) are presented to show their similarity to those of strains of *Streptomyces* spp. (figures 5 to 8). The cultures from which these illustrations were taken were made in the same way as for the examination of colonial morphology. As soon as possible after the colonies were found to be thickly covered with aerial hyphae and the beading of the aerial hyphae could be observed with 430 × magnification, samples were prepared by touching the apex of a colony with a film-covered screen and air dried.

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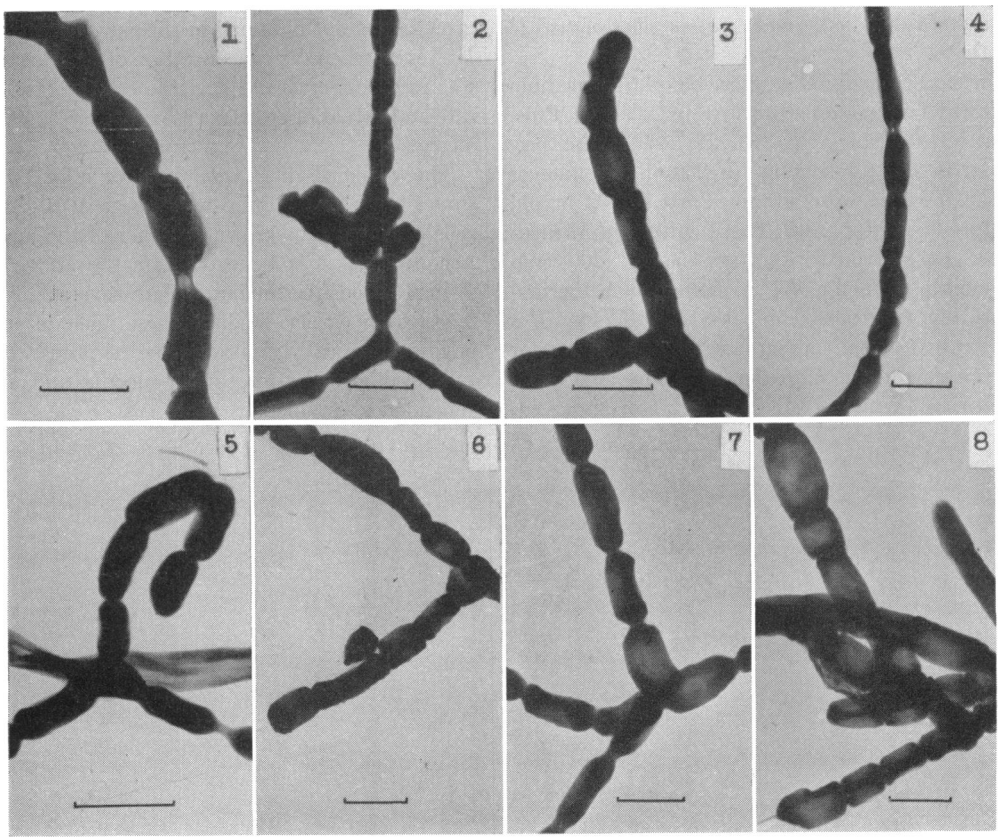

Figure 1. Sporulating aerial hyphae of NCTC strain 8595 of *Nocardia asteroides* on Bennett's agar at 11 days. *Figure 2.* NCTC strain 8595 of *Nocardia asteroides* on Bennett's agar at 13 days. *Figures 3 and 4.* Strain 730 of *Nocardia asteroides* on soil extract agar at 11 days. *Figure 5.* ATCC strain 618 of *Streptomyces albus* on yeast dextrose agar at 7 days. *Figure 6.* Waksman strain 3521 of *Streptomyces griseus* on Bennett's agar at 17 days. *Figure 7.* Waksman strain 3560 of *Streptomyces rimosus* on soil extract agar at 4 days. *Figure 8.* Waksman strain 3030 of *Streptomyces coelicolor* on soil extract agar at 4 days. Scale on all figures 1 μ.

APPARENT CONVERSION OF GALACTURONIC TO GLUCURONIC ACID BY *SERRATIA MARCESCENS*

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A previous report from this laboratory (J. Bacteriol., **72** 834, 1956) indicated that resting cells of *Serratia marcescens* cultured on either galacturonic or glucuronic acid, mineral salts medium, oxidized glucuronic acid much more rapidly than galacturonic acid. Subsequent studies have shown that 2.0 μmoles of oxygen are consumed per μmole of glucuronate provided and 1.5 μmoles of oxygen per μmole of galacturonate. Growth in glucuronate minimal medium is extensive and readily initiated, but sparse after a prolonged lag in galacturonate medium.

The possibility suggested by these findings that galacturonate may be converted to glucuronate by *S. marcescens* has been tested with dried cells from cultures agitated for 24 hr in uronic acid medium. Reaction mixtures were prepared containing 50 mg of dried cells per ml in M/15 phos-