Karyokinesis and Cytokinesis in *Micrococcus pyogenes* var. *aureus*[1]

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The cytology of the micrococci has been studied recently by Knaysi (4), Knaysi and Mudd (5), Bisset (1), and DeLamater (3). The nuclear structures reported indicate a basic uninuclear condition. Multinuclear cells are often observed during the logarithmic growth phase possibly as a result of karyokinesis occurring more rapidly than cytokinesis (4). A different interpretation (1) is that the cocci are multicellular rather than multinuclear and unstained septa separate the nuclei. Such observations and conclusions are principally based on use of the Feulgen stain, Acid-Giemsa stain and electron microscopy. Recently a new technique for staining the bacterial nucleus, not involving acid hydrolysis or other drastic treatments, has been developed (2).

Nuclear stains of various aged cultures of *Micrococcus pyogenes* var. *aureus* FDA 209 were made using the Chance technique (2). This stain reveals nuclei of vegetative cells which are apparently round, oval, or rod shaped. These probably represent different views of a disc-shaped nucleus.

In many rapidly growing cells the nucleus constricts and divides forming an elongated cell with two nuclei. In some of these cells both nuclei divide in a plane perpendicular to the first division which results in the formation of a large round cell containing four nuclei. The fate of these multinucleated cells has not been determined.

Cells with three nuclei are produced when one nucleus of a cell containing two nuclei divides prior to the other. Many cells are observed with one large and one small nucleus, indicating the occurrence of a quantitative reduction division. The Chance stain does not stain the cell wall and thus fails to indicate whether septa separate the nuclei of multinuclear cells as suggested by Bisset (1).

In many cells of young cultures, the nucleus becomes large, oval, and light staining. A cell plate forms through the center of the nucleus perpendicular to the long axis of the nucleus which has elongated slightly, and develops to extend to both sides of the elongated cell. As the nucleus further elongates and divides, the cell also further elongates. The cell plate material appears to differentiate into cell wall material, and the daughter cells tend to assume the typical spherical shape of the cocci.

The formation of a cell plate preceding cell division is also reported in *Gaffkya tetragena* (Chance, in press) and has probably been observed

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by DeLamater in a Micrococcus species (3). The origin and staining reaction of the cell plate identifies this structure with nuclear material as cell wall material is not stained.

Nuclear division observed both with and without the appearance of a cell plate may be due to either a varying constitution of the cell plate which influences its staining reaction or critical requirements for staining the cell plate which have not been uniformly achieved.

LITERATURE CITED

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