Conclusion

Our observations indicate that, in *Streptococcus pyogenes*, new cell wall is not diffusely intercalated with the old, but its formation is instead initiated equatorially along a circumference which is the site of the next cross-wall formation. These findings, made by labeling of living cells, confirm the conclusions expressed by Bisset (*13*) concerning the site of the main growth of the cell wall in septate bacteria. The new cell wall growth, in actively dividing cultures, is well under way, and the cross-wall may have progressed centripetally halfway, before there is complete separation by cell wall of the two previously formed cocci; as a result, the predominant forms in a chain appear as diplococci. The method at present does not indicate the presence or absence of cytoplasmic membrane septa, and does not therefore confirm or deny the activity of any part of such a membrane in secreting cell wall. It is obvious, however, that there are at least two sites of simultaneous activity—membranous or other—within the bounds of any one coccus as defined by cell wall furrowing: at one (*I*, Fig. 1) cross-wall to complete the previous division is still being formed, and at the other (*II*, Fig. 1) peripheral cell wall and cross-wall for the current division are being initiated.

Our findings and interpretations apply only to *S. pyogenes*. The methods described, however, should be widely applicable to any microorganism, with antigenic cell wall components, which can be grown in the presence of homologous antibody (*14*).

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Index for Measurement of Synchronization of Cell Populations

Abstract. An index for the estimation of synchronization in a microbial population is proposed and discussed. The index is equal to the fraction of cells that divide during a measured interval in excess of the fraction that would divide during random growth in the same interval.

In studying the effects of various treatments on the synchronization of cell populations, it is desirable to have a quantitative measure for comparing the amounts of synchrony obtained. Such an index should have the following characteristics. It should reach an upper limit if all the cells simultaneously carry out the particular reaction used as the criterion for synchrony. It should be proportional to the fraction of the cells undergoing the reaction and inversely proportional to the length of time in which the synchronized fraction of the culture carries out the reaction. It should permit positive identification of logarithmic growth even if the treatments have caused a lag or an acceleration of growth rate.

A number of indexes have appeared (*1*), but none seems to meet these requirements satisfactorily. We wish to propose an index that seems to be a reasonable compromise among these criteria. We have used cell division for the measurement of synchrony, but certain other parameters of growth could be used.

If the number of cells in a culture increases from N_0 to N in an interval t less than one generation time g, then

$$N/N_0 - 1$$

is the fraction of cells in the culture which divide during t, and

$$2^{t/g} - 1$$

is the fraction of cells in the culture which would have divided during t if the culture had been growing logarithmically. The quantity

$$F = (N/N_0 - 1) - (2^{t/g} - 1)$$
$$= N/N_0 - 2^{t/g}$$

measures the fraction of the population which divides during t in excess of that expected to divide during logarithmic growth in the same interval.

F has a maximum value of $+1$ if the entire population divides during an infinitely small time interval. It has positive values less than 1 if doubling takes a finite time (which, of course, it must), or if less than the entire population divides during the measured interval. After a synchronized burst of divisions, the population must increase at a rate less than that of normal logarithmic growth, and F falls to negative values. Thus the criterion for synchronized cell division is a positive value followed by a negative value. (The index should never fall below -1.) A logarithmically growing culture has an index of zero over any interval. An index of 0.8 (followed by a negative index in the next interval measured) would indicate excellent synchrony (*2*).

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Hydrostatic Pressure Has a Selective Effect on the Copepod Tigriopus

Abstract. High hydrostatic pressures have been found to be an agent in producing a shift in the sex ratio in populations of the marine copepod *Tigriopus.*

The study of the effect of hydrostatic pressure on the harpacticoid copepod *Tigriopus* was initiated in an attempt to obtain morphological mutations in this organism. These experiments revealed a definite shift in sex ratio of the pressure-treated organisms and are therefore being reported here.

The first experiments consisted of collecting adults from their natural habitat in the splash pools of the supralittoral tidal zone and subjecting them to various levels of hydrostatic pressure to determine a survival curve. At pressures from 1 to 500 atm and short exposure intervals 100-percent survival was observed. In view of the relative