this group is involved in binding the substrate. The first group must catalyse a subsequent step in the reaction. These two residues can be tentatively identified, on the basis of the pK values, as histidine and lysine. A second pH study at 17°C is being carried out to determine the shift in pK values with temperature and hence the heats of ionization of the groups, and thus give further evidence as to the identity of the groups at the active centre.

Inhibition studies were also carried out. A trial of a number of nucleotides and nucleosides showed a surprising lack of inhibition by compounds of structure similar to the substrate. Guanosine and guanine, however, partially inhibit the reaction. A number of derivatives of benzo[b]thiophen with a secondary or tertiary amine side chain, e.g. 5-chloro-3-(2-dimethylaminoethyl)benzo[b]thiophen hydrochloride, or a guanidine side chain, e.g. *N*-(4-bromobenzo[b]thien-2-yl)guanidinium toluene-*p*-sulphonate, show marked non-competitive inhibition. The tricyclic antidepressants of the phenothiazine type, such as desipramine, show strong non-competitive inhibition. This explains the increase in the concentration of cyclic AMP in the urine of depressive patients treated with antidepressant drugs of this type (Abdulla & Hamadah, 1970). Both the phenothiazine derivatives and the benzo[b]thiophen derivatives have a secondary or tertiary amine group in the side chain that, at the pH values chosen for the inhibition study, pH 7.0 and 8.5, are ionized and positively charged.

I thank Mr A. R. Mason for his assistance with the kinetic work, Dr K. Clarke for samples of benzo[b]thiophen derivatives and the Medical Research Council and Reckitt and Colman Ltd. for financing the work.

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Cell Division in *Sarcina flava*

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Although Chapman (1960) and Cherny (1967) have discussed aspects of the fine structure and cell division in *Sarcina lutea*, no such reports exist for *Sarcina flava*.

During the process of cell division, a distinction has been suggested between cell-wall septation and cell-membrane septation (Chapman, 1959, 1960; Chapman & Hillier, 1953). Centripetal growth of a ring of material is common to both processes, but

the former is usually characterized by the association of mesosomes with the developing septum. In the latter process cell-membrane septation is followed by deposition of cell-wall material on the dividing membrane. More recently an intimate association between mesosomes and the bacterial nucleus in a dividing cell has been proposed (Ryter & Jacob, 1967).

In the present work *S. flava* (N.T.C.C. 7503) were fixed in 1% osmic acid at pH 9 for 4h, and dehydrated in an ascending ethanol series and then epoxypropane before being embedded in Araldite resin by stirring to a uniform suspension before hardening. Sections were cut on an L.K.B. Ultramicrotome and stained with 2% uranyl acetate in 50% ethanol. Electron micrographs show that septation by cell-wall material is preceded by the formation of a complete membrane septum accomplished by centripetal growth of an infolding of the cytoplasmic membrane, eventually forming a double-membrane septum. This is followed by deposition of cell-wall material between the two layers of this membrane and continuous with the parent cell wall. Each layer of the double membrane becomes part of the cytoplasmic membrane in the two daughter cells once division is complete. It is reasonable to assume that cell-wall precursors are synthesized in the membrane or in the cytoplasm and transported across the membrane to the site of their incorporation into the growing cell wall. Thus division in *S. flava* involves cell-membrane septation followed by the synthesis of a cell wall and is similar to the division sequence reported for *Diplococcus pneumoniae* (Tomasz, Jamieson & Ottolenghi, 1964). At no time was any evidence seen for the involvement of mesosomes in this process, and when mesosomes were seen during division they tended to be localized at one pole of the cell, whereas in cell-wall septation mesosomes are invariably seen associated with the developing septa.

D. T. is grateful to the Science Research Council for financial support and M. I. S. H. is in receipt of a Science Research Council research studentship.

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