Actinobolin-induced Filamentation in Escherichia coli

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The inhibition of protein synthesis has been reported to be one mechanism by which actinobolin inhibits the growth of mammalian and bacterial cells (L. L. Bennett, personal communication; D. E. Hunt and R. F. Pittillo, Can. J. Microbiol. 12:515, 1966). Recent observations have revealed that cells of Escherichia coli which have been grown in the presence of actinobolin become extremely elongated.

E. coli ATCC 9637 was used in this work; maintenance and growth media, and preparation of inocula have been described (D. E. Hunt and R. F. Pittillo, Can. J. Microbiol. 12:515, 1966). To determine the effect of actinobolin on the gross morphology of E. coli, the surface of glucose-salts-agar plates, containing an inhibitory concentration of actinobolin (30 μg/ml), was inoculated with a saline (0.85% NaCl) suspension of the test organism. Gram-stained preparations revealed that cells from colonies which developed in the presence of the above-indicated concentration of actinobolin were extremely elongated (Fig. 1). No significant degree of filamentation was observed when a lower, slightly inhibitory, concentration (10 μg/ml) of this antibiotic was used. Several diverse types of antimicrobial compounds, such as azaserine (R. E. Maxwell and V. S. Nickel, Science 120:270, 1954), Atabrine (J. Ciak and F. E. Hahn, Science 157:655, 1967), penicillin (K. V. Thimann, The Life of Bacteria, p. 821, The Macmillan Co., New York, 1963), and chloramphenicol (F. J. Bergerson, J. Gen. Microbiol. 9:353, 1953), have been reported to cause filamentation in bacteria; however, it is premature to attempt to correlate these reports with actinobolin-induced filament formation, since the mechanism by which the latter antibiotic inhibits E. coli growing on agar has not been elucidated.

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FIG. 1. Actinobolin-induced filamentation in Escherichia coli ATCC 9637. Cells from colonies grown on glucose-salts-agar containing 30 μg of actinobolin/ml (top) and on inhibitor-free glucose-salts-agar (bottom). Approximately × 1,125.