The rate of development of colonies of *Bacterium lactis aerogenes* on agar plates containing drugs

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Abstract

When bacteria are plated on a solid medium containing a drug, only a fraction \(a_\infty\), often very small, of the cells ever form colonies. \(a_t\), the fraction which have done so at time \(t\), has been determined as a function of time, together with \(a_\infty\), for various trained and untrained strains of bacteria in presence of a series of drugs. *Bacterium lactis aerogenes* (*Aerobacter aerogenes*) has been studied in this way in presence of brilliant green, proflavine, chloramphenicol, streptomycin, terramycin, thymol, sodium azide and isonicotinyl hydrazine; and *Bact. coli mutabile* in presence of chloramphenicol, and propamidine.

In some of the examples the curves of \(a_t/a_\infty\) against time are clearly and obviously incompatible with the postulate that the resistant forms in the trained culture are pre-existent in the original. Separate experiments, moreover, have shown in these examples that a large concentration of non-resistant forms does not in fact delay the growth of forms already adapted.

In other examples the \(a_t/a_\infty\) against \(t\) curves are less sharply contrasted for the trained and untrained strains. Here, however, \(a_\infty\) for the trained strain may represent practically the whole population, while for the untrained strain it is \(10^{-6}\) or less.

The statistical result of comparing, in attempts to estimate numbers of mutants, the average of one population with the extreme tail of another is examined. It is concluded that the \(a_t/a_\infty\) relations, even in the second type of example, are as consistent with the occurrence of adaptations in competition with lethal actions on the plate as they are with the growth of mutants.

The resistance of strains re-tested after isolation from resistant colonies is highly variable.