I

Avery

Contributions of pneumococci to bacterial genetics

Jaworski Avery et al. 1944 first showed attention to DNA. So it led everything to do with genetics, molecular genetics.

But pneumococci was the difficult problem that motivated much of the systems. Hemophilus & Bacillus eventually led.

But don't overlook:


But associates linkage with several changing DNA molecules.

And so there has been no growing school of research as they have for the systems based in bacterial genetics.

Bacterial nucleus:

PS

There is no logical connection between nuclei of bacteria and mitosis. This is an organized nucleus.

With a single chromosome. The only consideration would be a single membrane, and thus it is useless to consider mitosis (meiosis is any event).

(certainly my thinking!)

They may consider some quite spectacular of the mitotic figures claimed by Brown & Dobzhansky. But I would not disagree with light microscopy. Esp if one postulated a single long flaccid chromosome, barely readable.

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cell contains a special genetic substance or structure, differentiated to perform genetic functions..." (Taylor, 1949).

CORRELATING CYTOLOGICAL AND GENETIC INVESTIGATIONS

Other speakers at this symposium will have discussed in more detail the present status of bacterial cytology and its bearings on bacterial genetics. A number of workers have presented convincing evidence for the presence of nuclei in bacterial cells, but their identification as nuclei has hitherto been based only on incomplete morphological and cytochemical evidence, in the absence of any more direct opportunity to locate the genes within them. A most attractive objective would be a documentation of the nuclear events associated with genetic recombination in E. coli K-12, or any other suitable organism, but this is on the horizon, not at hand.

Meanwhile, many investigations of mutagenesis have been predicated on probably fallacious models of bacterial cells as constructively isolated genes, despite the contrary cytological evidence for the multi-nucleate condition of most rod-shaped bacteria. Many of the characters used in bacterial mutation research are recessive (e.g., resistance to phage or streptomycin) so that mutations induced in unicellular colonies could not begin to exert their phenotypic effect until nuclear separation has occurred. In this respect a comparison of our recent opportunity to examine single endosporers might be fruitful.

The establishment of nondisjunctional or "diploid" cultures opened the question of cytological comparison of Z and N for the purposes of a bacterial cytogenetics. For some time, preparations like that illustrated in Figure 5, have encouraged this hope. Diploids, often show cells of greater uniform length than haploids, and with chromatic structures of greater apparent complexity. Very often, there appeared to be two larger, more dispersed "nuclei" per cell, in contrast to two pairs of more condensed nuclei that often characterize comparable haploid cultures. The structure of the "nuclei" is obscure, so that we were unable to examine the connection of the granules to determine whether they form a single connected group or several groups. So far, our material, interpretations, or techniques (HCl-Giemsa) have not sufficed to demonstrate nuclear mitotic figures, but there are many unmistakable examples of symmetrically placed groups of chromatin both in haploid and diploid cells. The preparations so far studied do not admit of any clear interpretation in terms of doubled chromosome, and it is not yet excluded that the differences reside principally in a better expansion and resolution of nuclear structure in the diploid cells. In occasional preparations haploid cultures have shown nuclei of the same order of complexity in chromatic structure as diploids (Figure 6), but to date one of us has consistently failed to classify stained smears prepared by another, ostensibly by virtue of the nuclear criterion. On two occasions, a cytological determination correctly anticipated a later genetic definition of the status of a culture (one was a secondary Lys- homokaryote; one a haploid culture carrying an unstable gene which simulated the Vige of heterozygosity). The further cytological analysis may well rest upon technical and statistical advantages of the kind discussed elsewhere in this symposium.

Stern (1950) and others have reported that nuclei can be visualized in living bacteria by phase contrast microscopy. This technique has remarkable advantages for observing cells as a whole, but only faint suggestions of the nuclei are apparent in preparations of E. coli K-12. There is considerable fluctuation in the definition of the presumed chromatin (which appears light...