

Bacteriostatic activities of some sulphanilamide derivatives

Compound	Maximum dilution which is active against	
	Staphylococcus aureus	Strepto hemolyticus
1. Ethylene-bis-N ⁴ -sulphanilamide ²	1:1000	1:5000
2. Methylene-bis-N ⁴ -sulphanilamide ²	1:2000	1:2000
3. Trimethylene-bis-N ¹ -sulphanilamide ²	1:1000	1:1000
4. Ethylene-bis-N ⁴ -(N ⁴ heptyl-sulphanilamide) ³	1:1000	1:1000
5. Ethylene-bis-N ⁴ -(N ¹ acetyl-sulphanilamide) ³	1:1000	1:1000
6. N ⁴ -Sulphanilamido-acetic ester ⁴	1:1000	1:1000
7. N ⁴ -Sulphanilamido-acetic acid ^{1, 4}	1:2000	1:2000
8. N ⁴ -Sulphanilamido-propionic ester ⁴	1:10000	1:1000
9. N ⁴ -Sulphanilamido-butyric ester ⁴	1:1000	1:1000
10. N ⁴ -Sulphanilamido-malonic ester ⁴	1:1000	1:1000
11. N ⁴ -Sulphanilamido-phenyl acetic ester ⁴	1:1000	1:5000
12. N ⁴ -Sulphanilamido-phenyl acetic acid ⁴	1:1000	1:1000
13. N ¹ -p-chlorophenyl-N ⁵ -p-sulphonamido-phenyl biguanide hydrochloride	1:1000	1:1000
14. N ¹ -p-chlorophenyl-N ⁵ -p-phenyl sulphonamido-2-thiazole-biguanide hydrochloride	1:1000	1:5000
15. N ¹ -p-chlorophenyl-N ⁵ -isopropyl-biguanide acetate (Paludrine) ⁶	1:1000	1:1000

Pharmacology Section,
Indian Institute of Science,
Bangalore,
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S. NATARAJAN.
H. L. BAMI.

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ENDOPOLYPLOIDY IN YEASTS

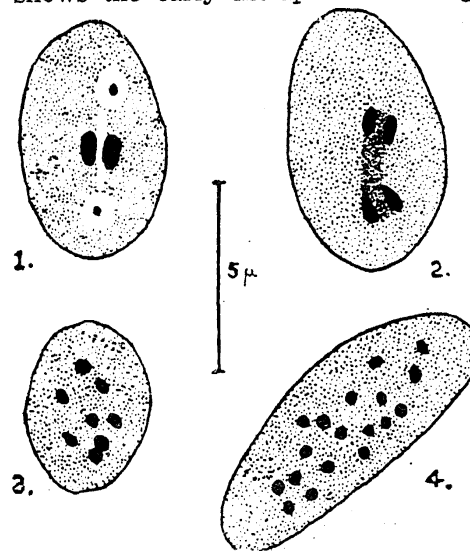
ARE fermenting cells comparable to actively secreting glandular cells? As far back as 1910, Wager and Peniston¹ suggested such a comparison. And yet, the importance of the above suggestion does not appear to have been realized by later workers. Anyone conversant with the cytology of glandular secretion (Bowen²) would be aware that secretory cells take their origin from embryonic replacement cells. Gland cells themselves fall into two distinct categories. In the "holocrine" type, the cells die after a single secretory cycle, while in the "merocrine" type, they pass through several secretory cycles before death supervenes. It has been known for the past one decade that merocrine cells show various degrees of endopolyploidy (White³). Some of the remarkable advances in our knowledge of the genetics of *Drosophila* are based on the study of polytene chromosomes in the endopolyploid nuclei of the salivary gland cells. Resting nuclei of gland cells may or may not show polytene chromosomes. In fact, in many cases their endopolyploid constitution could only be inferred. Cancer cells possess an inherent impulse for rapid multiplication, and it appears that polytene chromosomes could be observed during stages of division (Biesele⁴). Gland cells show only occasional metaphases and the earlier controversy regarding the behaviour of the nucleus in gland cells (Kater⁵) is reminiscent of a similar state of affairs in yeasts (Nagel,⁶ Lindgren⁷). To investigate the question whether the failure of gland cells to divide mitotically is the result of their highly endopolyploid constitution Brués and Marble⁸ and Biesele⁴ stu-

died the cytology of regenerating livers. This was under the belief that partial removal should accelerate mitotic division and bring to light the chromosomes and thus afford evidence regarding the constitution of the nuclei of glandular cells.

If fermenting yeast cells are endopolyploid, then it should be possible to demonstrate the same by experiments planned on similar lines. Just as surgical removal accelerates mitotic division in the liver, replacement of the spent wort with fresh medium in fermenting cultures produces the same effect.

Therefore, tubes of wort were inoculated with the brewery strain Sc. 9 and after the lapse of five days the spent medium was poured out and replaced with the same quantity of fresh medium. The contents of the tubes were centrifuged and smeared at five-minute intervals commencing from 40 minutes after the addition of fresh medium. The descriptions are based on Feulgen preparations.⁹

The mitotic cycle during the aerobic phase has already been described for this strain.^{10,11} Fig. 1 shows the early metaphase showing the



two chromosomes, the centrioles with their centrospheres and the developing spindle. In Fig. 2 is shown the anaphase.

An examination of the preparations of fermenting cells induced to multiply by addition of fresh medium shows dying cells as well as healthy ones. In healthy cells various division pictures are present. There are rare clusters of cells showing the typical stages seen in the aerobic phase. The majority show varying degrees of polyploidy. In Figs. 2 and 3 two such cells showing different numbers of chromosomes in the cytoplasm are illustrated. The stages of division of such cells are irregular. Often they are abortive. Regular meta- and anaphase stages are rare and the chromosomes generally do not get segregated during division into equal complements. The bud often gets only a much smaller number. There is also a fair percentage of cells showing amitosis-like figures. These are probably the highly endopolyploid cells whose nuclei are unable to resolve themselves completely into their component chromosomes in spite of the very favourable environmental conditions. The stimulus afforded by the nutriment and the availability of dissolved oxygen leads to abortive attempts at division as evidenced by the amitosis-like figures observed.

By their multiplication the embryonic cells in glands replace those that die after a varying number of secretory cycles. It appears likely that a similar state of affairs occurs in fermenting cultures also, where a small percentage seem to retain their power of normal vegetative reproduction (Slator¹²). The products of division of fermenting cells have no *genetical future at all* unless of course a small percentage go through a series of reduction divisions as in the multiple complex cells of *Culex* (Grell¹³).

Two workers from the same laboratory have recently presented differing interpretations of the structure of the yeast cell (Nagel,⁶ Lindgren⁷). While Miss Nagel has found it necessary to coin new terms to denote the various structures in the yeast cell, Lindgren seems to have changed his previous opinion¹⁴ and basing his conclusions on the casual suggestion of Rafalko¹⁵ now believes that yeasts have conventional Feulgen positive chromosomes. He has yet to prove that the homologies of the structures seen by him are identical with those observed by Rafalko.

In view of the varying behaviour of the nuclei during aerobic growth and fermentation, it is not surprising that there is such a remarkable diversity of opinion. In fact one has to expect it. It would be evident that the differing interpretations are not due to the technique of fixation and staining as assumed by Nagel but in the handling of material for cytological investigations. The cytological behaviour of glandular cells in animals are interpreted in terms of changes from normal in response to specialization and no generalization is attempted based on results on glandular cells alone. Yet, generalizations on the nuclear behaviour in yeasts appear to be based on the tacit assumption that there is no difference between a growing culture and a fermenting one. The fact that the yeast is versatile and possesses oxidative and fermentative abilities was forgotten. That the cytology of a dividing cell is entirely different from that of a cell in active secretion was ignored. The tremendous importance of the above distinction can be

imagined when it is realized that an actively growing culture would become a fermenting one, when there is not enough dissolved oxygen in the medium for respiration. Once this simple distinction is made, it would be evident that the cytology of yeasts is in no way different from that of higher organisms.

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Dept. of General Chemistry,
Indian Institute of Science,
Bangalore, (S. India), M. K. SUBRAMANIAM.
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AN UNUSUALLY EFFECTIVE CONTROL OF A PEST BY A PARASITE

THE two species of *Epilachna* beetles, *Epilachna dodecastigma* Muls. and *E. vigintioctopunctata* Fab., are serious pests of the brinjal plant in the United Provinces as also in other parts of India. For several years past, the seasonal incidence of these two pests has been under routine observation at Cawnpore, but no sudden changes in their population, as a result of attack by natural enemies, had been noticed. Early in September 1946, however, a heavy parasitisation of the *Epilachna* grubs by *Pleurotropis* sp.* (*Eulophidae-Chalcidoidea*) was observed in a brinjal field, about half an acre in area at Cawnpore. During the second, third and fourth weeks of September, large numbers of the adult parasites emerged from about 300 *Epilachna* grubs kept in the laboratory for rearing. Simultaneous observations in the field showed that towards the end of the month, practically every grub had been parasitised and the pest brought under complete control. This quick work by *Pleurotropis* sp. against its *Epilachna* hosts is worthy of record. During the period of the field observation, the average maximum and minimum temperatures were 92.7° F. and 77.9° F. respectively and the average relative humidity 84.7 per cent.

The genus *Pleurotropis* has over two dozen species distributed in nearly all parts of the world. The three identified species so far known in India, viz., *P. detrimentosus* Gahan, *P. epilachnæ* Rohwer and *P. foveolatus* Crawford¹, as also some unidentified species, were all reported from Bangalore, Coimbatore or Cochin (South India). The occurrence of a