remained in this solution for 24 hours at + 3° C. Then the concentration of the coloured solution was ascertained photometrically, and from the figures obtained the amount of dyestuff absorbed per mgm. tissue was calculated. The results are given in Fig. 2.

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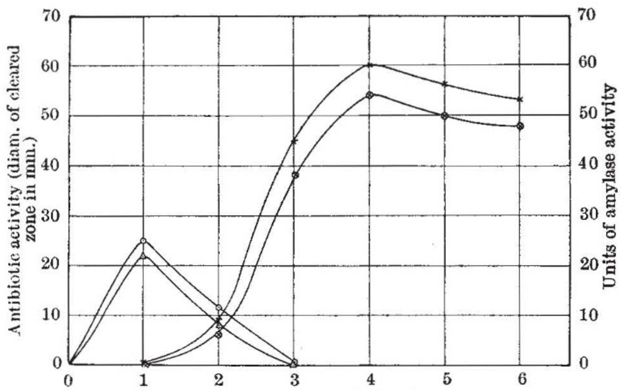
Antibiotic Activity as Shown by a Highly Amylolytic Strain of *Bacillus subtilis*

In the course of an investigation on the formation of amylase by *Bacillus subtilis*, it was observed that the organism, when grown on wheat bran medium, showed a pronounced antibiotic activity. The maximum activity was found in the aqueous extract from a 24-hour-old culture. The amylase formation during this period was found to be low, but steadily increased with further incubation. This phenomenon led to a study of the relationship between the antibiotic production and amylase formation by *B. subtilis*[1] (N.C.T.C. : 2027 *N*) when grown on wheat bran.

The production of substances of antibiotic nature by *B. subtilis* has been studied by earlier workers. It has been shown that three compounds, bacillin, subtilin and bactracin, which are characterized by their bacteriostatic and lytic actions on different Gram-positive and Gram-negative organisms, are synthesized by the various strains of *Bacillus subtilis*. Recently, work has been conducted employing wheat bran as a whole or wheat bran extracts for culturing *P. notatum*[2,3]. These observations indicate the possibility of increasing the penicillin yield by about 60 per cent. It has been suggested that as wheat bran has a fairly high fat content, the fatty acids liberated during the growth of fat-splitting organisms are responsible for the antibiotic action. No direct proof has, however, been advanced to demonstrate the origin of the antibiotic substances from fatty acids.

Bacillus subtilis was grown on wheat bran (10 parts) moistened with the phosphate buffer solution (*p*H 7·0; 25 parts) for the production of amylase[4]. A control series using de-fatted wheat bran was also run along with the experimental series. The extracts were made with water (25 parts) at intervals of every 24 hours. The mass was then strained through cheese cloth and the extract filtered through Whatman's filter paper No. 42. The amylase and antibiotic activities of the clear filtrates were then determined. The antibiotic activity was tested against *Staphylococcus aureus*, by the cup assay method[5]. The results obtained are given in the accompanying table.

Age of the culture (days)	Amylase activity (units per ml.)		Antibiotic activity (diameter of the zones in mm.)	
	Whole wheat bran	De-fatted wheat bran	Whole wheat bran	De-fatted wheat bran
1	Negligible	Negligible	25·0	22·0
2	9·0	6·5	11·0	8·0
3	45·0	38·0	Negligible	Negligible
4	60·0	54·5	,,	,,
5	55·5	50·0	,,	,,
6	53·0	48·0	,,	,,



Amylase and antibiotic activity of *B. subtilis*. ×—×—, ⊙—⊙—, wheat bran whole; ⊕—⊕—, △—△—, wheat bran de-fatted

The results show that an active strain of *B. subtilis* is able to synthesize antibiotic substances during the earlier stages leading to the production of amylase. This antibiotic activity cannot be attributed to the liberation of fatty acids, because the activity is developed even on de-fatted bran.

The antibiotic activity is at a maximum on the first day of growth and gradually disappears with extended incubation. On the other hand, amylase production, which is negligible on the first day, steadily increases as the incubation period proceeds, and reaches its peak value on the fourth day. These observations show that there is some relationship between the production of antibiotic substances on one hand and amylase formation on the other. Probably the secretion of antibiotic substance at an earlier stage serves to prevent invasion by undesirable organisms. In the light of the observations already made by Rao and Murti[6], the lag phase in amylase formation may bear some relation to the development of antibiotic substances. Further work in this direction is in progress.

My thanks are due to Prof. V. Subrahmanyan for his interest and guidance.

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Aug. 30.

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Origin of the Radio Frequency Emission and Cosmic Radiation in the Milky Way

Recent measurements by Hey, Parsons and Phillips[1] on the angular distribution of the galactic radio-frequency radiation at 64 Mc./s. and particularly the observations by these authors, by Bolton and Stanley[2,3] and by Ryle and Smith[4] on variable sources of radio-frequency radiation in low and high galactic latitudes strongly suggest a revision of current ideas on the origin of this radiation.

The interpretation of galactic radio-frequency radiation by free-free transitions of electrons in the interstellar gas, as advanced by Reber, Henyey and Keenan[5] and also adopted by myself[6], besides being obviously unable to explain the variable radiations now meets with the following difficulties :