

Dept. of Physics
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Dr. Joshua Lederberg
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Dear Dr. Lederberg:

As far as I know, there is nothing in the literature of the subject of chemotaxis aside from mere descriptions of observed chemotactic phenomena. Molisch (1) describes a number of these, which seem to support the general idea that an abrupt decrease in "metabolic rate" is associated with a tactic response. Working along this hypothesis, in an attempt to identify this association more specifically, I am currently making a fairly exhaustive study of the influences of light and oxygen on phototactic and aerotactic responses, and on the rates of photosynthesis and oxidative metabolism. It would be interesting to see whether *Salmonella* exhibits a similar correlation between tactic behavior and metabolic activity. This could be checked with such things as substrate, acid or alkali, and oxygen. A sensitive method of detecting aerotaxis is the following: A slide, spacer, and cover glass are joined with vaseline to form a cell in which a moderately turbid suspension of micro-organisms is contained. The spacer, of glass or aluminum, should be about $\frac{1}{2}$ mm thick and 1 cm in diameter. After the suspension has achieved a more or less steady-state condition in the cell, a small air bubble is introduced by prying the cover glass slightly. Accumulation or withdrawal from the bubble can then be observed.

Contradicting the above hypothesis are the action spectra ~~sixmaxxatgws~~ for phototaxis of many algae. In these cases, which I referred to in my third article, light absorbed by chlorophyll does not appear to be concerned with phototaxis, the carotenoids alone being active.

The energy for motility does not appear to be derived directly from early metabolic pathways, but rather from some stored source. The evidence for this is scant; it is found to some extent in Engelmann's writings (2,3). The mean speed of locomotion of *Rhodospirillum rubrum* was found by Thomas and Nijenhuis (4) to increase with temperature in the usual manner; I have also found this to be true. On the other hand, I have noticed that such factors as light intensity and presence or absence of substrate have no observable influence on the

Wg motility of *R. rubrum*, except after several hours. These factors certainly govern the occurrence of tactic responses, at least in the purple bacteria.

I hope that this sketchy account will be of some use to you. Also, I believe that there is lots of stuff in the literature, of which I am not aware. A person who might be of considerable help in this matter is

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Sincerely yours,

Roderick Clayton

Roderick Clayton

1. Molisch, Die Purpurbakterien nach neuen Untersuchungen, Jena, G. Fischer, 1907.
2. Engelmann, Pflüg. Arch. f. d. ges. Physiol. 30, 95(1883)
3. " Botan. Ztg. 46, 661 (1888)
4. Biochim. et Biophys. Acta 6, 317 (1950)