beryllium, some atoms of the metal penetrate the surface of the cells, thus anchoring a layer of the bacterial cytoplasm to the film. This layer is normally removed when the film is stripped, although sometimes whole cells adhere to the film as shown in Fig. 1. The process can be repeated and a further section of the same group of cells obtained. Fig. 2 shows such a section from a young and rapidly dividing culture of Enterococci (*Str. fœcalis*). The cell appears to contain a round, well-defined body which seems to divide at the same time as the cell. It is further possible to treat the sectioned bacteria with agents (such as enzymes or antibodies) and to re-examine the sections on the beryllium film. The section can be washed with buffers and digested with enzyme preparations. It should thus be possible to combine this technique with cytochemical investigation. The result of such studies will be described in a further communication.

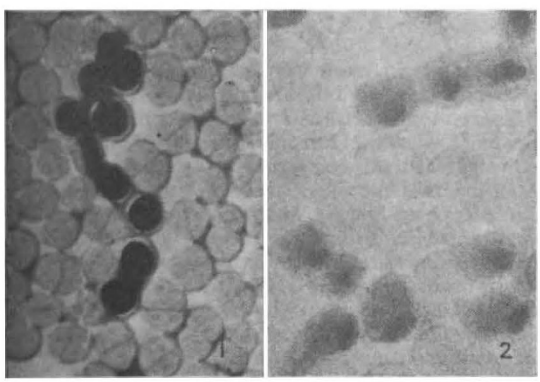


Fig. 1. Surface section through Enterococci (5-hr. culture). × *c.* 9,000

Fig. 2. Third section through Enterococci (5-hr. culture). × *c.* 12,000

I am deeply indebted to Prof. M. Siegbahn, who has constructed the microscope with which the pictures were taken and who has placed all facilities at my disposal, and to Prof. N. Hast, who encouraged me to use the beryllium as supporting membrane. The photographs were taken by Mr. Rosenquist.

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[1] Hast, *Nature*, **159**, 354 and 370 (1947).

## Polarization of Radiation from Distant Stars by the Interstellar Medium

Photometric observations for the detection of partially polarized radiation from eclipsing binary stars have been in progress at Yerkes Observatory, of the University of Chicago, for several years with the view of establishing observationally the effect pointed out by Chandrasekhar that the continuous radiation of early-type stars should be polarized[1,2]. On the assumption that the opacity of early-type stars is due to scattering by electrons, the continuous radiation emerging from a star should be polarized with a maximum of polarization of 11 per cent at the limb. Since the presence of this polarization can be detected only when the early-type star is partially eclipsed by a larger late-type companion of the system, the effect is masked by radiation from this companion, so that the expected maximum observable effect is only of the order of 1·2 per cent in the one case investigated (*RY* Persei).

However, the observations made in connexion with this problem have led to the detection of a new phenomenon which appears to have a bearing on the constitution of interstellar matter. Three Wolf–Rayet spectroscopic binaries (two of which are known to be eclipsing) in Cepheus were observed with the following results:

| Star | Polarization | |
|---|---|---|
| | Per cent | Position angle |
| *CQ* Cep. | 10·0 | 62 |
| *BD* + 55° 2721 | 8·0 | 44 |
| *WN* Anon* | 12·5 | 44 |

* No catalogue number.

If the polarization were associated with the individual stellar systems, there should be a change in the polarization, in position angle and amount, with the phase of the binary motion. However, no such change was observed. In order to determine possible systematic errors in the receiving equipment, I investigated the polarization of comparison or control stars of similar colour and brightness. With the exception of *BD* + 55° 2723, no significant polarization was found in the control stars. *BD* + 55° 2723 gave 3 per cent polarization with a position angle of 44°. This particular star differs from the other control stars in that it is a giant, and is consequently more distant than the other control stars, which belong to the main sequence.

Similar observations were made on a group of Wolf–Rayet stars in Cygnus, which showed no significant polarization, while two stars in Scutum gave positive results. Other regions, such as the double cluster in Perseus, also show polarization with values ranging up to 12 per cent.

We conclude from the positive and negative results quoted that the measured polarization does not arise in the atmosphere of these stars, but must have been introduced by the intervening interstellar medium. If this conclusion is accepted, a new factor in the study of interstellar clouds is introduced. Further observations are in progress for relating this phenomenon with other observable characteristics of the interstellar medium. The results already at hand indicate that the plane of polarization approximates to the plane of the galaxy.

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Dec. 27.

[1] Chandrasekhar, S., *Astrophys. J.*, **103**, 365 (1946).
[2] Hiltner, W. A., *Astrophys. J.*, **106**, 231 (1947).

## Possibility of a Phase Transition in the Pure Helium Isotope of Mass 3

Sydoriak, Crilly and Hammel[1] have reported the preparation and separation of the pure helium isotope of mass 3. They have succeeded in condensing it and have determined its vapour pressure in the temperature range 1·21°–3·34° K. (the critical temperature) and its boiling point at 3·20° K. These vapour pressure measurements appear to have interesting consequences with regard to the possibility of a phase transition in the pure helium isotope of mass 3. They provide evidence for such a transition at 1·9° K. In this communication, the possibility of this transition is first examined, the vapour pressure equations in the two ranges 1·2–