LABORATORY NOTES
LIGHT THERMOSTAT FOR THE CULTIVATION OF HALOBACTERIUM HALOBIUM

By

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A simple light thermostat was built for the cultivation of Halobacterium halobium. The advantage of this apparatus as compared to the climate chambers and phytotrons, which are generally applied for cultivation, is that it is easy to handle and the production cost is very low.

The apparatus

The frame of the thermostat is made of angle-bar and fixed on a wooden base (Fig. 1). The back and side walls are covered with textile-bakelite plates. The light-tubes are fitted to the internal walls, and the choke-coils to the external walls; thus, the choke-coils do not heat the interior compartment. The light thermostat is situated in a laboratory with a volume of approximately 50 m^3. A sketch of the apparatus is shown Fig. 2.

20 W, 220 V 35 light tubes are used for illumination and heating of the cultivation-space. The illumination can be employed in six grades of intensity. Two switches are connected in parallel to two groups of light tubes on the right hand wall, two switches to two groups of six light tubes on the left-hand wall, and one switch each to groups of six and seven light tubes on the rear wall. Accordingly the intensity of illumination, in the middle of the space where the cultivation tube is located, can be varied between 500 and 3500 lux. The front of the thermostat can be closed to different degrees by means of bakelite sheets, depending on the required temperature of the inner space. The top of the thermostat is open in order to let the superfluous heat out of the cultivation space and it can readily be conducted away from the laboratory. The laboratory is thermostated with a Lehel AK 2F climatizer.

The top of the compartment is bridged; from the center of the bridge an iron rod projects downwards and supports the cylindrical culture tube.

Results of cultivation

The culture medium was prepared in a standard manner [1]. A period of 1.5 h is necessary to warm the culture compartment to 38 °C. The climatizer thermostating the laboratory at 23—24 °C is switched on only after the culture compartment

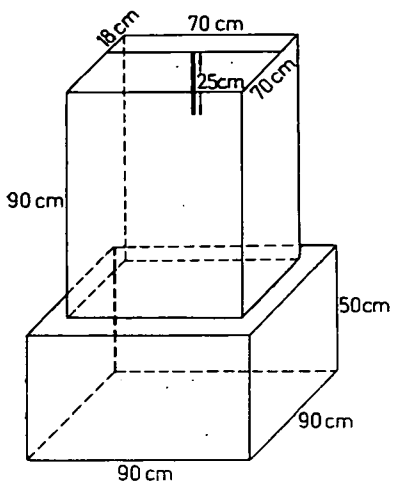

Fig. 1. Scale drawing of thermostat

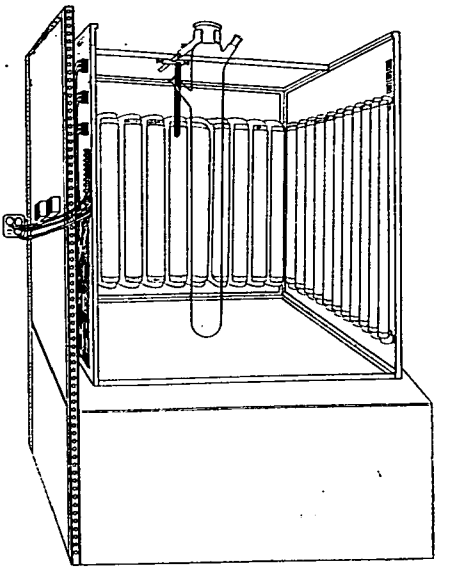

Fig. 2. Sketch of thermostat

and the laboratory can be maintaned at almost constant value. The culture is supplied with oxigen by two Cyklon air-pumps connected parallelly. The velocity and quantity of air passing through are regulated by a toroid-transformer operating the air pump. Our experimental results show that a flow rate of 25 $cm^3\ l^{-1}\ min^{-1}$ is optimum during the first 2.5—3 days of cultivation. After this period the flow rate is halved. 24 h after the beginning on the cultivation the cells are counted and the scattering spectrum of the culture is recorded. These operations are repeated at 14—16 h

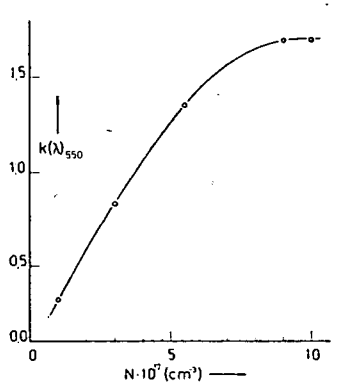

Fig. 3. Variations of intensities of light scattered by cell suspension and of absorbed light with the increase of the number of cells

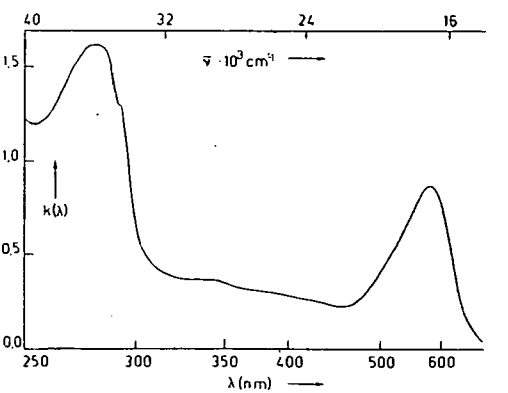

Fig. 4. Absorption spectrum of purple membrane

intervals. A calibration curve was prepared from the cell-counting data and the scattering spectra (Fig. 3). This can be used together with spectroscopic measurements to follow the development of the culture continously. At 38 °C with an air flow rate of 25 $cm^3\ l^{-1}\ min^{-1}$ and an illumination of 3500 lux, the cultivation lasts for about 60—70 h. Our results to date show that on average the quantity of cells obtained from each culture is 8 $gr\ l^{-1}$. The customary methods were used to obtain the purple membrane and to prepare the bacteriorhodopsin [1]. The absorption spectrum of the purple membrane was taken with a Specord UV-VIS Spectrophotometer (Fig. 4), and aggrees well with the spectra reported in the literature [2].

Acknowledgement

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Literature

[1] *Oesterhelt, D., W. Stoeckenius:* Methods in Enzymology **31**, 667 (1974).
[2] *Becker, B. M., J. Y. Cassim:* Preparative Biochemistry, **5**, 161 (1975).

СВЕТОВОЙ ТЕРМОСТАТ ДЛЯ КУЛЬТИВИРОВАНИЯ БАКТЕРИЙ ТИПА HALOBAKTERIUM HALOBIUM

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Для культивирования бактерий типа Halobakterium halobium был создан простой световой термостат. По сравнению с обычно применяемой климатической камерой, т. е. фитотроном, преимущества установки состоят в простом управлении и малой стоимости.