bands, respectively, whatever the impurity density. Since each of these ζ-levels will be constant through the crystal, this involves a leveling-out of the potential fluctuations (Fig. 1c), which will become marked when the concentration of holes and electrons introduced by illumination becomes comparable with the net concentration maintained by impurities and thermal excitation. This leveling of the potential barriers, and the attendant decrease in resistivity, will thus occur for lower illumination the more exact the balancing of the two types of impurities, and the lower the temperature. The observation of Chasmar (*1*), that high frequency conductivity is little affected by illumination, indicates that this, rather than any increase in the number of available carriers, is the important factor in the photoconductivity of these films. Very pure PbS films should also show photoconductivity, their low intrinsic conductivity being increased by the carriers produced by illumination; their sensitivity to illumination, should, however, be markedly less.

It appears, then, that high photosensitivity of PbS films is to be sought by careful balancing of fairly high contents of *n*- and *p*-impurity atoms in films of the order of 1 μ thick, made as homogeneous as possible; random fluctuations in impurity distribution will suffice to produce the required potential fluctuations in the film. Use of the films at low temperatures is also indicated.

A theoretical study of the potential distribution and conductivity in these films, as it depends on temperature and illumination, is now in progress.

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On the Direct Fermentation of Maltose[1]

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During the course of isolating and identifying bacteria of the genus *Neisseria* from the nasopharynx of humans, several strains were encountered which fermented maltose with acid production while glucose was not fermented. The fermentation of a disaccharide without fermentation of either of its constituent monosaccharides (direct fermentation) by bacteria has been reported by Wilson and Smith (*5*). Wright (*6*), Douderoff *et al.* (*1*), and Snell *et al.* (*3*), have reported on a strain of *Lactobacillus bulgaricus* which utilized lactose but not glucose or galactose. such observations are not in accord with the generally accepted concept of indirect fermentation, which presupposes a cleavage of the disaccharide to its monose constituents, which are fermented as such. The subject of direct and indirect fermentation has been reviewed by Liebowitz and Hestrin (*2*).

TABLE 1

pH Values Produced in Glucose and Maltose Broth by Several Strains of *Neisseria*

Culture	Media*	
	Glucose broth	Maltose broth
	pH	pH
No. 4	8.3	6.0
" 12	8.1	5.7
" 55	8.3	6.3
" 876	7.9	5.6

* BBL phenol red broth containing peptone and meat extract, pH 7.2–7.4. The glucose and maltose were sterilized by filtration and added aseptically to sterile phenol red broth to give a final concentration of 0.5%. The pH values were determined after 7 days' incubation at 35° C.

The results obtained with four cultures of *Neisseria,* when cultivated in glucose and maltose broth, are shown in Table 1. In each instance, the organisms produced acid from maltose while an alkaline reaction developed in the glucose medium. It may be noted that an acid reaction in the vicinity of pH 6.0 is a limiting factor for the growth of most *Neisseria.*

Further observations were made comparing culture No. 12 to a strain of *Neisseria sicca,* which ferments both glucose and maltose. Each of these organisms was cultivated in glucose and maltose broth for a 5-day period, after which the residual sugar was determined by the method of Somogyi (*4*). The culture of *N. sicca* effected complete utilization of both carbohydrates, while culture No. 12 utilized approximately 75% of the maltose and little, if any, of the glucose. In addition, experiments employing the Warburg manometric technic showed that the oxygen uptake with cells of *N. sicca* was approximately the same for both glucose and maltose. For culture No. 12, the oxygen uptake with maltose was approximately that obtained with *N. sicca*; with the glucose, the uptake was only slightly greater than that of endogenous respiration.

The maltose used in the above experiments was chemically pure (Pfanstiehl). All determinations have been repeated using maltose recrystallized from chemically pure maltose and treated with norite five times. No differences in results were obtained.

These results suggest that the *Neisscria* described are capable of a direct fermentation of maltose.

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