THE FORMATION OF SEMI-TRANSPARENT MEMBRANES FROM CULTURES OF SLIME-PRODUCING MICRO-ORGANISMS

THIS article presents a brief description of a procedure developed at this laboratory for the successful production of semi-transparent sheets resembling parchment from cultures of slime-forming micro-organisms.

The investigations of Beijerinck[1] and Harrison[2] have made important contributions to fundamental knowledge of the viscous fermentations. These authors considered an appreciable number of causal species and described the formation of specific slimy materials. As a result of this work, attention has been directed to numerous groups of slime-forming bacteria, including the levulan-forming types, the producers of dextran, the cellulan-yielding group and those forming the nitrogenous slimes or mucins.

Concerning the class of nitrogenous slimes, stringiness in cultures of marine bacteria (Sanborn[3]) was developed to a degree of cohesiveness which permitted the drawing out of the slimy substance into fine, continuous filaments. Preliminary experiments showed that, with the aid of a coagulating bath, it was possible to convert these filaments into flexible threads. While such films proved to have little economic value, the results obtained were sufficiently arresting to justify the investigation of other slime-forming groups along similar lines.

In a recent article on the microorganisms involved in the formation of pulp and paper mill slimes, the author[4] has emphasized the filamentous and yeast-like fungi in addition to the bacterial groups. The slimes formed by this diversified flora were heterogeneous, and variously designated to indicate the major types. Of all the viscous materials produced in the carbohydrate media provided, the gelatinous, cellulose-like masses formed by certain species of Oidium and Monilia, possessed the most promising qualities. These organisms built up abundant, doughy surface growths which became tough and leathery after several weeks. Development was rapid in glycerol and potato decoction, resulting in the formation of thick, rubbery mats in the shallow layers of this medium. Dextrin or glucose may be substituted for glycerol.

The growths were collected and subjected to treatments, the purpose of which was to convert the slimes either into strands or into comminuted masses. The material could then be brought into uniform suspension and deposited upon the sheet-forming substratum. The formation of the sheet, due, in all probability, to the coalescence of the slime particles, was readily achieved. In one case the material was digested in zinc chloride and regenerated in the form of strands, in water. According to the other method the growth was comminuted directly by agitation, without digestion. This more direct procedure, now employed exclusively, yielded sheets of lighter color and greater transparency than could be produced by the former method.

Immediately following their formation, the sheets were treated with a lubrication emulsion to give them flexibility, resilience, and sizing qualities. The process was completed by drying in a steam hot plate sheet dryer. A more complete account of these slime sheets will occur in a later article.

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