

Use of Silicones in Aerobiology

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In studies of organic and inorganic materials of the air, particularly in the epidemiology of rusts and other fungus diseases (4) and in allergy studies with pollen grains (1), it has been common practice to collect the specimens on glass slides covered with some adhesive such as vaseline, glycerine-jelly, or oil. In our investigations of airborne fungi and bacteria we have encountered temperatures as low as -48°C . At such low temperatures ordinary adhesives become too viscous or congeal and are unsatisfactory. The silicones made by the Dow Corning Corporation¹ seemed to offer possibilities as a substitute for the usual adhesives because of their retention of physical properties at low as well as high temperatures, and they were accordingly investigated. They have proved to be so satisfactory that it is considered worth while to call these new techniques to the attention of workers in this and related fields.

Slides coated with silicone grease (DC-4-ANC-128-A) have been used successfully in collecting rust, smut, and *Alternaria* spores from the air. Such preparations are superior to vaseline-coated slides for the following reasons: (1) The background is white, making an effective contrast. (2) The consistency remains unchanged at temperatures ranging from -75°C to over 200°C . (3) The slides can be sterilized, if desired, in dry heat for 2 hr at 180°C . Many other silicones are available which might also be used for this and similar purposes.

In ordinary studies of airborne fungi and bacteria, exposure of agar plates from airplanes has been common practice (3, 5). However, Proctor and Parker (1, p. 49) have shown that agar plates exposed to low temperatures will freeze and give sterile readings even in nonsterile air. This problem has been overcome by coating the bottom of a Petri plate with silicone grease, sterilizing at 180°C for 2 hr, exposing the plates from an airplane and pouring in melted agar on return to the laboratory. Under these conditions, bacteria and fungi produce satisfactory colonies. Fungi grow through the overlying agar to the surface and sporulate normally; bacteria and yeasts develop between the two layers, forming typical sub-surface colonies. Some bacteria are freed when agar is poured in and colonies develop in or on the agar. Isolations from any of these colonies can be made without difficulty. The principal advantage of this method is that plates may be exposed to extremely low temperatures for an indefinite period without any physical change or danger of freezing. By this technique cultures have been obtained from plates which were exposed to air temperatures as low as -48°C .

It would appear to us that these two methods might prove very useful in many phases of aeromycology and aerobacteriology, particularly where exposures are to be

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made at low or high temperatures. In routine exposures for stem and leaf rust studies, as well as for other cereal pathogens, silicones appear to be more satisfactory than vaseline. They should also be very satisfactory for the collection of pollen grains in allergy and other studies. For collecting microfauna and even small insects, the silicones would probably work equally well. They should prove of value also in fields other than aerobiology, particularly in snowflake and ice crystal investigation, and in studies of dust at high altitudes or even in the stratosphere.

References

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Relation of Surface Phagocytosis to the Fibrinous Character of Acute Bacterial Exudates¹

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Evidence has recently been presented that encapsulated bacteria which cause acute respiratory disease are phagocytosed in the body in the absence of opsonins by a mechanism termed "surface phagocytosis" (2, 8). Leucocytes operating in the presence of various tissue structures have been observed to ingest and destroy type I pneumococci, Friedlander's bacilli, group A hemolytic streptococci, and staphylococci (7). Although the encapsulated bacteria escape phagocytosis when floating freely in a fluid medium, they are readily phagocytosed when trapped against tissue structures by the leucocytes. Also, when caught in a sufficiently dense concentration of leucocytes, they may be pinned between the surfaces of two or more cells and thus phagocytosed (6). Of the microorganisms so far studied, only type III pneumococcus is resistant to surface phagocytosis (5). Its ability to escape the leucocytic pseudopods has been shown to be due to an outer "slime layer" of capsular polysaccharide which is present only when the organism is multiplying rapidly. When the slime layer is lost with aging of the bacterial population, type III pneumococcus becomes susceptible to surface phagocytosis.

Since leucocytes utilize tissue structures in phagocytosing encapsulated bacteria in the absence of antibody, it would seem likely that they may utilize in a similar manner the fibrinous strands that characteristically occur

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