

periments (such as beaten egg white, foams produced from solutions of corn steep liquor, Rinso, and Tide) either interfered with the Winkler method or were unstable. However, when nitrogen was bubbled from a Pyrex gas dispersion tube with fritted cylinder through a 2.5% solution of gum arabic, a thick foam developed which completely covered the solution and in spite of agitation stayed intact for about an hour. Fig. 2 shows

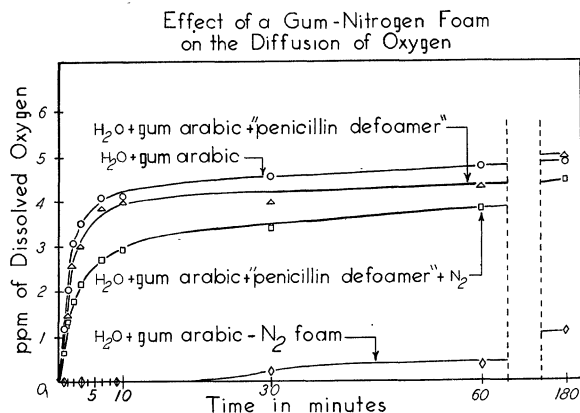


FIG. 2. The rate at which oxygen diffused during the first 30 sec, in ppm per hr per 150 ml of liquid was: 140 for the gum arabic solution; 150 for the gum arabic solution containing 0.05 ml of penicillin defoamer; 80 for the gum arabic solution that contained 0.05 ml of defoamer and through which nitrogen was bubbled; 0 for the gum arabic solution covered with a gum arabic-nitrogen foam.

that, as long as this foam persisted, the diffusion of oxygen was almost completely prevented. The possibility that the flushing with nitrogen removed enough oxygen from the overlying atmosphere to decrease the rate of diffusion was examined by repeating the experiment in the presence of 0.05 ml "penicillin defoamer." This antifoam agent prevented the foam, and diffusion proceeded at a fairly rapid rate. Flushing with nitrogen apparently did decrease the rate of diffusion somewhat, as can be seen from the absorption curve for the solution of gum arabic that contained the antifoam agent but through which no nitrogen was bubbled. The fact that oxygen diffused more slowly into the gum solution than into distilled water can probably be explained by an increase in the viscosity of the solution. Gum arabic did not interfere significantly with the Winkler titration. When gum concentration was increased in intervals of 0.5% from 0% to 3%, the diffusion rate decreased markedly while the titration blanks at zero time were about the same for all levels.

These results do not necessarily imply that the foaming that occurs during actual shake-flask fermentations interferes as seriously with aeration as did the gum arabic-nitrogen foam in our experiments. They do, however, draw attention to the need for further studies on the aeration of microbial cultures.

OPAL B. STARKS AND H. KOFFLER

Department of Biological Sciences,  
Purdue University

## Only Qualified Praise of Chisholm's "Social Responsibility"

George Brock Chisholm's article (*Science*, January 14, p. 27) received the unqualified approval of Rollin G. Myers in your March 11th Comments and Communications section (p. 264), and it appears justified to express in these pages some criticism on a basic point of Dr. Chisholm's philosophy since it is hoped that almost everybody in this country, at least, will agree with Dr. Chisholm's aims and efforts in general.

The point in question is Dr. Chisholm's concept of "original sin." Dr. Chisholm says "The uncomfortable fact is that very few people indeed can love themselves in a healthy natural way which tolerantly accepts all their own human urges as normal and inevitable aspects of the healthily functioning man or woman. Most of us, by being civilized too early or too forcibly, have been driven to believe that our natural human urges are 'bad,' 'not nice,' 'wicked,' 'sinful,' or whatever the local equivalent may be. . . . Unfortunately, the concept of 'sin' is, under one name or another, very firmly entrenched throughout much of the world."

It would seem that Dr. Chisholm is unfamiliar with the history of the Christian concept of "original sin" and particularly with the attitudes of such outstanding contemporary theologians as Reinhold Niebuhr and Paul Tillich. Suffice it to quote from R. Niebuhr's *Beyond tragedy, essays on the Christian interpretation of history* in condensation as follows: "Sin is not so much a consequence of natural impulses which in animal life do not lead to sin as of the freedom of reason by which man is able to throw nature out of joint and to make fateful decisions in human history. . . . Sin lies at the juncture of spirit and nature. . . . The most basic need of the human spirit is the need for security. . . . The primary insecurity of human life arises from its finiteness and weakness. . . . When man looks at himself he finds himself to be only one of many creatures in creation. But when he looks at the world he finds his own mind the focusing center of the whole. When man acts he confuses these two visions of himself. He knows that he ought to act as to assume only his rightful place in the harmony of the whole. But his actual action is always informed by the ambition to make himself the centre of the whole. . . . When thought gives place to action, self intrudes itself into every ideal. . . . His sin is to turn creatureliness into infinity. . . . when he centers his life about one particular impulse. . . . tempted by his peculiar situation of being a finite and physical creature and yet gifted to survey eternity."

It is exactly, then, the recognition of being sinful, the concept of the ever-present danger of deceiving himself, which ennoble man and which offers a hope of overcoming the great difficulties of present international human relationships.

OTTO E. GUTTENTAG

University of California Medical School  
San Francisco