In studying the problem of antisepsis in the presence of protein, it is important to determine whether it is only the unadsorbed fraction of the dye which acts as an antiseptic, or whether the portion which is adsorbed on the protein also exerts this action. This was tested upon the amount of CO_2 production by yeast grown in sucrose solution. Taking our curves for antiseptic strength in water alone with the curve of antisepsis in the presence of protein, and comparing these with the adsorption curves, it is evident that not only the free crystalloid, but also the adsorbed fraction, exert antiseptic action. The adsorbed fraction, however, exerts only a part of the action that would correspond to the amount of dye present.

Thus, crystal violet in a concentration of 1/20,000 in the presence of 1% albumin should behave like a solution of 1/125,000 concentration if only the free dye is actively antiseptic. Experimentally it was found to behave like a crystal violet solution of 1/35,000 concentration.

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Is Schnitzer's "Interference" Between the Action of Two Chemotherapeutic Substances Due to Surface Reactions?

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Browning and Gulbransen[1] discovered the remarkable fact that although the injection of basic fuchsin cured rats infected with trypanosomiasis and acriflavine injections had the same effect, if animals previously fed basic fuchsin by mouth were infected with fuchsin-fast trypanosomes, and later acriflavine was injected, the therapeutic action of the acriflavine was prevented and the animals died of trypanosomiasis. They gave to this action the name of "interference phenomenon." These observations were confirmed by Schnitzer[2] (both with fuchsin-fast and normal trypanosomes) who showed that it applied also to other triphenyl methane dyes, *e. g.*, methyl violet and brilliant green, and to arsenicals, *e. g.*, arsphenamine and arsacetin.

*The experiments reported in this paper form the basis for a part of a Thesis presented by Harold N. Wright in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of Minnesota (May, 1929).

[1] Browning, C. H., and Gulbransen, R., *J. Path. and Bact.*, 1922, xxv, 395.

[2] Schnitzer, R., *et al.*, *Z. f. Immunitatsforsch. u. exper. Therap.*, 1926, xlvii, 116; xlviii, 23; xlix, 387, 393, 551; 1927, liii, 439; liv, 324.

Since these experiments seem to raise questions that are fundamental in the problem of chemotherapy, it is important to determine whether they can be explained as merely surface reactions upon the trypanosomes or whether one must have recourse to other more abstruse processes of metabolism or vital phenomena.

We have therefore attempted to determine whether a similar interference could be demonstrated upon the growth and CO_2 production by yeast in the test-tube. Our curves of CO_2 production by ordinary baker's yeast grown in a sucrose solution show that yeasts which have been definitely stained by methyl violet or by brilliant green in the test-tube, in solutions too weak to affect the CO_2 production, are less sensitive to acriflavine than are normal yeast cells. Vice versa, yeast cells stained with acriflavine in concentration too low to affect CO_2 production, are rendered less sensitive to methyl violet and brilliant green. This effect is not noticeable with basic fuchsin.

These experiments represent a complete parallelism *in vitro* to Browning's and Schnitzer's "interference phenomenon" *in vivo*, and render it probable that the latter can be explained as a simple surface reaction.

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Ultramicroscopic Studies Upon Colloidal State of Antiseptics and Arsenicals in Relation to Their Actions.*

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As Voegtlin[1] and others have shown that the action and toxicity of arsphenamine is closely related to their viscosity and colloidality, and as the action of antiseptics is greatly diminished by the presence of protein and of lipoids (Hirschfelder and Decherd[2]) we have studied the appearance of solutions of a number of these substances under the Szigmondy slit ultramicroscope. Solutions of arsphena-

* The experiments reported in this paper form the basis for a part of a Thesis presented by Harold N. Wright in partial fulfillment of the requirements for the degree of Doctor of Philosophy at the University of Minnesota (May, 1929).

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[1] Voegtlin, C., *U. S. Pub. Health Rep.*, 1924, xxxix, Part I, 179.

[2] Hirschfelder, A. D., and Decherd, G. M., PROC. SOC. EXP. BIOL. AND MED., 1928, xxv, 824.