Extraction of a Specific Antigen from the Virus of Lymphogranuloma venereum

MANY studies have been made concerning the antigenic structure of viruses of the psittacosis-lymphogranuloma group as revealed by the complement-fixation technique; these include experiments recently reported on the effect of various reagents on psittacosis virus[1]. It was shown that 0·001 molar potassium periodate destroyed the serologically active heat-stable group antigen of heated virus suspensions, while leaving some reactivity, due to the labile specific component, in similar but unheated preparations. The possibility that skin tests might be used for demonstrating the specific behaviour of virus treated with the same reagent was considered, since it is recognized that the preparations which have been or are used for this method of diagnosing lymphogranuloma venereum[2,3,4] produce skin reactions which are largely or entirely due to the group antigen[5,6]. Heated yolk-sac suspensions of both psittacosis and lymphogranuloma venereum viruses have, in this laboratory, given closely parallel results in patients with lymphogranuloma venereum[7].

Preliminary tests showed, however, that periodate, even in 0·01 molar concentration, did not alter the effect of heated suspensions of lymphogranuloma venereum virus in the skin of known reactors. This difference between the behaviour of the treated material in the complement-fixation reaction and in the skin test might be due to the fact that the amount of serologically active group antigen in the virus particle is very much less than that which plays a part in the allergic reaction.

It was thought that skin tests of another type of virus preparation might repay trial. The earlier serological experiments had also shown that dilute acid had an effect on elementary body suspensions like that of heat; the activity of the group antigen was enhanced, presumably owing to the destruction or solution of the specific component which gave inferior and irregular antibody reactions. It had not been possible to demonstrate by complement fixation any activity in clear supernatant fluids separated from acid-treated virus suspensions; Dr. R. R. A. Coombs very kindly tested the materials by the more sensitive conglutinating complement-absorption test[8] and also obtained negative results.

Extracts prepared by treating partially purified yolk-sac suspensions of psittacosis and lymphogranuloma venereum viruses with 0·02 *N* hydrochloric acid at 37° C. for twenty minutes were neutralized, the precipitate discarded, and tested undiluted in the skin of two patients who had recovered from psittacosis and five patients with lymphogranuloma venereum. Heated and diluted suspensions of normal yolk sac and of psittacosis and lymphogranuloma venereum viruses were also used. Both the psittacosis patients reacted to the heated homologous virus; one of them, infected fifteen years previously, gave no other reaction; but the second patient, six months after infection, reacted to the psittacosis virus extract as well. In the lymphogranuloma venereum patients it was found that heated suspensions of either virus could be used with equal effect, but that, of the extracts, only the homologous virus produced positive results; these preparations were uniformly specific. It thus appears that acid treatment of these two viruses carries into solution a specific antigen which, in that state or concentration, can be demonstrated by its skin reactivity but not by complement fixation.

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Transpiration into a Saturated Atmosphere

PROF. D. THODAY'S suggestion[1] (apropos of the work of Dixon and Barlee[2]) of a possible mechanism of transpiration into a saturated atmosphere, based on the enhanced vapour pressure of convex water surfaces, is an attractive one, especially as it is a logical corollary of the older idea of the significance, in the water economy of a wilting leaf, of the sub-normal vapour pressure of concave evaporating surfaces[3]. There are, however, certain difficulties in its application.

The increase in vapour pressure of a convex water surface becomes appreciable only when the radius of curvature is very small, and the corresponding exudation pressure necessary to maintain such a surface will then be very high. For example, the development of a vapour pressure even 1 per cent above normal would require an exudation pressure from the mesophyll cells of about 13 atmospheres: a 10 per cent increase would require about 130 atmospheres. Thus, although the formation of such highly convex surfaces may maintain evaporation in saturated air, it must place a heavy load on the necessary initial secretion process. Furthermore, convex menisci of the form visualized will be unstable at their minimum radius of curvature (that is, when they would be most effective as evaporating surfaces) and may readily give rise to much larger droplets. For though a progressively increasing exudation pressure is necessary initially to expand a plane water surface into a convex one, when the latter becomes hemispherical, further expansion, being accompanied by an increasing radius of curvature (and hence requiring a lower equilibrium internal pressure), takes place spontaneously. This effect may be simply demonstrated on a comparatively large scale by the slow extrusion of a droplet, under a small 'head' of water, at the end of a thick-walled capillary tube. The tube must be free from grease internally and the end should be ground flat and waxed to simulate the assumed conditions of the capillaries of the walls of the mesophyll cells.

If convex menisci are formed on the walls of mesophyll cells, some injection of the intercellular spaces may therefore be expected to follow. This is in accord with Lewis's observation[4] of the formation of a *layer* of water on the surfaces of mesophyll cells. It is perhaps significant also that Dixon and Barlee observed some injection of the intercellular spaces of the leaf in one of their experiments.