comatose state which sometimes terminated fatally, but usually ceased in a few minutes. Such tetanic symptoms are well known for other species in magnesium deficiency.

The minimum magnesium requirement of the normal rat is approximately 50 p.p.m. in the diet.[2] The requirement of the chick appears to be much higher, approximately 400 p.p.m. during the first weeks of life. The response of the chick to magnesium deficiency is also much more rapid than that of the rat. In view of these results, it seems appropriate to advise adequate provision for the magnesium requirement in experimental chick diets.

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Relationship of Agents of Trachoma and Inclusion Conjunctivitis to Those of Lymphogranuloma-Psittacosis Group.

GEOFFREY RAKE, MORRIS F. SHAFFER AND PHILLIPS THYGESON.

From the Squibb Institute for Medical Research, New Brunswick, N. J., and the Institute of Ophthalmology, Presbyterian Hospital, New York.

While the nature of the etiologic agents of trachoma and inclusion blennorrhea is still not indisputably established, they appear to belong to the group of agents generally known as viruses and the great preponderance of evidence points to a causal relationship for the elementary and initial bodies which are characteristically present in the lesions.[1]

That these elementary and initial bodies, and other related structures are similar in morphology and dimension to those found in psittacosis and lymphogranuloma venereum has been pointed out.[2, 3] Moreover, with the exception of the glycogen reaction, which is positive for the large plaques in trachoma and inclusion blennorrhea,[4] but negative for those in psittacosis and lymphogranuloma venereum,[3] the tinctorial characteristics of the morphological units in all 4 diseases are similar.

A further bond between the two groups lies in the fact that of all

2 Tufts, E. V., and Greenberg, D. M., *J. Biol. Chem.*, 1938, **122**, 715.

1 Julianelle, L. A., *The Etiology of Trachoma*, The Commonwealth Fund, N.Y., 1938.

2 Thygeson, P., *Am. J. Path.*, 1938, **14**, 455.

3 Rake, G., and Jones, H. P., *J. Exp. Med.*, 1942, **75**, 323.

4 Rice, C. E., *Am. J. Ophth.*, 1936, **19**, 1.

the so-called virus diseases only 4, namely trachoma, inclusion blennorrhea, lymphogranuloma venereum, pneumonitis of mice,[5] together with the rickettsial infection of heart-water in sheep,[6] are known to respond to chemotherapy with the sulfonamide drugs.

It has recently been demonstrated that a powerful complement fixing antigen can be prepared for lymphogranuloma venereum by the propagation of the agent of this disease in the yolk-sac of the embryonated chick egg.[7] Furthermore, it has been shown that this antigen gives marked cross fixation with sera from individuals infected with other members of this group of agents, *i. e.*, psittacosis or pneumonitis.[8] It seemed of interest, therefore, to test the sera of individuals infected with trachoma or inclusion blennorrhea by the same method to see whether any cross-fixation would occur here.

The results are shown in Table I. It was found that in the case of adults suffering from chronic trachoma (Institution EI) our usual routine of fixation at 37° C for 1½ hours gave fixation at serum titers comparable to those obtained with some lymphogranulomatous sera. Fixation was obtained not only with elementary body suspensions, but also with Seitz filtrates containing soluble antigen. The titers could be increased without loss of specificity by additional fixation in the icebox overnight before adding the sensitized sheep cells. This latter method was therefore adopted in the case of sera obtained from an outbreak of acute trachoma among male inmates of one cottage in an institution (L) for feeble minded, and by this method several such sera, *i. e.*, 6 of 8, were found to show fixation in low dilution. Frei tests were negative in those cases in which they were carried out.

One serum from an adult with inclusion conjunctivitis also gave fixation titers comparable to those of the trachoma patients, while the serum of an infant (G.D.) with acute inclusion blennorrhea showed evidence of slight fixing power.

These results indicate that the agents of both trachoma and inclusion conjunctivitis show a definite antigenic relationship to the Lymphogranuloma-Psittacosis group of agents. It seems to us possible that the low titers of fixation encountered may be due to less antigenic relationship than exists between lymphogranuloma

[5] Rake, G., Jones, H. P., and Nigg, C., PROC. SOC. EXP. BIOL. AND MED., 1942, **49**, in press.

[6] Neitz, W. O., *J. S. African Vet. Med. Assn.*, 1940, **11**, 15.

[7] McKee, C. M., Rake, G., and Shaffer, M. F., PROC. SOC. EXP. BIOL. AND MED., 1940, **44**, 410.

[8] Rake, G., Eaton, M. D., and Shaffer, M. F., PROC. SOC. EXP. BIOL. AND MED., 1941, **48**, 528.

TABLE I.
Results of Complement Fixation Tests with Lymphogranuloma Venereum Antigens and Sera from Cases of Trachoma or Inclusion Conjunctivitis.

Patient	Institution	Eye infection		Serum titer in Comp. Fix. tests† vs. Lg. V.		Frei test
		Stage‡	Duration	Elementary bodies	Soluble antigen	
Ga	E.I.	III	>10 yr.	6		
E.B.	"	IIa	6 mo.?	60	30	Neg.
M.St.	"	III	> 5 yr.	30	15	
L.Z.	"	III	> 6 "	15	6	
R.R.	"	III	> 5 "	< 6	15	
L.C.	"	III	>10 "	30	15	
D'A.	"	III	>15 "	15	30	
F.S.	"	I		< 6	6	
Y.L.S.	"	IV		6	—	Neg.
S.U.	"	IV		6	—	"
M.T.	"	IV		15	—	"
We.	"	IV		15	—	"
V.B.	L*	I		6	6	"
J.C.	"	III		< 6	6	"
N.G.	"	IIa		< 6	< 6	"
J.L.	"	III		<15	15	"
C.M.	"	III		< 6	< 6	"
E.P.	"	III		6	15	"
S.S.	"	III		15	6	"
H.S.	"	IIa		15	15	"
St.V.	E.I.	Inclusion conjunct.	3 wk.	60	—	"
G.D.	"	"	2 "	6	6	

*The serum from 6 other feeble-minded trachomatous patients in the same cottage in institution "L" were tested but were either anticomplementary or gave non-specific fixation with the antigen controls prepared from normal yolk-sac.

†Fixation 1½ hours at 37°C + overnight at 2°C.

‡MacCallan's classification: Stage I, incipient trachoma, stage II established trachoma, IIa follicular hypertrophy predominant, IIb papillary hypertrophy predominant, III cicatricial trachoma, IV arrested trachoma.

venereum and psittacosis. On the other hand, it may be due to the local and limited nature of the disease which, because it has no phase of systemic invasion, builds up antibodies only slowly. In the acute cases of trachoma the short duration of the disease might also account for the slight or negative antibody response as might the physiological immaturity which existed in all of this latter group.