

EXPERIMENTAL PANOPHTHALMIA DUE TO *Mycoplasma pneumoniae*

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Much evidence has now been obtained in support of a possible etiologic role of mycoplasmas not only in diseases of the respiratory organs, but also in diseases of other organs and systems. There have been a few descriptions of eye diseases, especially in children, associated with mycoplasma infection [1, 3-5, 8]. It has also been reported [11] that mycoplasmas have no direct effect on the development of inflammatory diseases of the eyes, but a link between the action of mycoplasmas and autoallergic eye diseases has been detected on the basis of serologic investigations. Data in the literature relate to mycoplasmas causing eye diseases in experimental animals [2, 6, 7, 10, 12, 13].

The object of this investigation was to study the morphological changes developing as a result of infection of rabbits' eyes with a culture of *M. pneumoniae*.

EXPERIMENTAL METHOD

Experiments were carried out on rabbits receiving an intraocular injection of a culture of *M. pneumoniae* in a volume of 0.2-0.3 ml. The rabbits were killed at intervals ranging from 1 day to 2 months after the injection. The enucleated eyes were fixed in 10% formalin and embedded in celloidin and paraffin wax. Serial sections were stained with hematoxylin and eosin and by van Gieson's method. Other material was impregnated with silver by Foot's method and subjected to histochemical tests for RNA (Brachet) and DNA (Feulgen), the PAS reaction with controls, and the reaction with toluidine blue.

EXPERIMENTAL RESULTS

Morphological investigation of the rabbits' eyes infected with the culture of *M. pneumoniae* revealed changes as early as on the 1st day: edema of all membranes of the eye, marked vasodilation, and hemorrhages in some places. Considerable foci of infiltration with lymphocytes and histiocytes, containing a few plasma cells, were observed in the conjunctiva of the eye, the lateral part of the cornea, and the iris (Fig. 1a, b). The chamber of the eye contained an exudate in which there were collections of leukocytes and many granules of *M. pneumoniae* antigen giving a positive reaction with the PAS method and with toluidine blue (Fig. 1c). Later all the phenomena described above increased in intensity and, in addition, agglutination thrombi were found in some vessels. Cells of the exudate were in a state of disintegration and lymphoblasts and plasmablasts appeared. On the 11th day exudate also was found in the anterior chamber of the eye; it contained fibroblasts and thin connective-tissue fibrils, and the PAS reaction revealed a very large quantity of *M. pneumoniae* antigen (Fig. 1d). At this stage of the investigation edema and lymphohistiocytic infiltration had intensified and now affected all membranes of the eye; they contained a larger number of plasma cells at different stages of maturity and also of eosinophils. The blood vessel walls, like the endothelium, were swollen and some of them were surrounded by infiltration. The retina and optic nerve showed marked changes at this time. All layers of the retina were highly edematous and the layer of ganglion cells was depopulated (Fig. 1e). The optic papil-

*Deceased.

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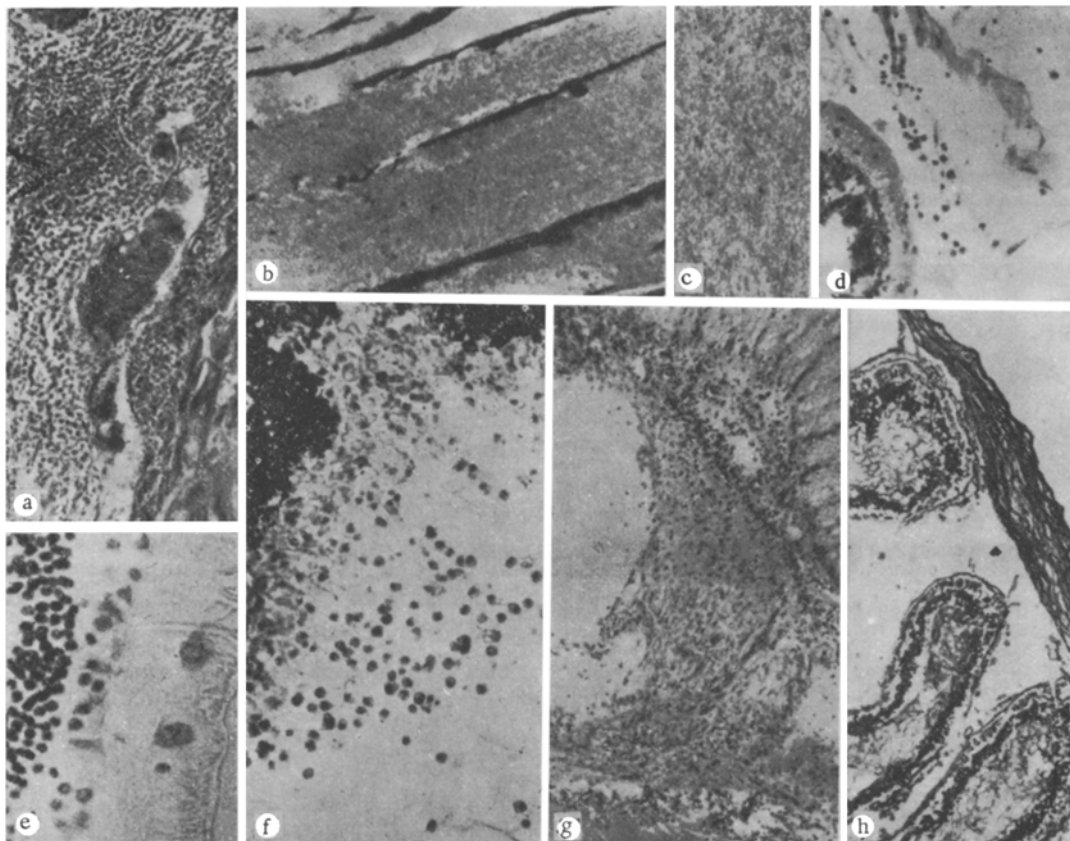


Fig. 1. Changes in rabbits' eyes after intra-ocular injection of culture of *M. pneumoniae*: a) edema, infiltration with lymphocytes and histiocytes, congestion of vessels and hemorrhage in ocular conjunctiva on 1st day after infection. Hematoxylin-eosin, 120 \times ; b) severe edema and congestion of vascular coat on 1st day after infection. Hematoxylin-eosin, 120 \times ; c) disintegrating exudate in internal cavity of eyeball, containing granules of *M. pneumoniae* antigen on 3rd day after infection. Reaction with toluidine blue. Magnifying glass; d) plasma cells, thin connective-tissue fibrils, *M. pneumoniae* antigen in internal cavity of eyeball on 11th day after infection. PAS reaction, 120 \times ; e) severe edema of all layers and depopulation of layer of retinal ganglion cells on 11th day after infection. Toluidine blue, 500 \times ; f) formation of connective-tissue fibrils, infiltration with plasma cells in region of ciliary processes on 26th day after infection. Hematoxylin-eosin, 250 \times ; g) adhesion between retina and lens on 26th day after infection. Hematoxylin-eosin, 120 \times ; h) dense adhesion between ciliary processes on 26th day after infection. Impregnation with silver by Foot's method, 120 \times .

1a was edematous and infiltrated with cells, among which there were dilated blood vessels and massive foci of perivascular infiltration. There was marked destruction of lens tissues with infiltration by polymorphs and plasma cells.

By the 18th-26th day the process was still acute, although it had become productive in character. Many plasma cells appeared in the foci of infiltration, and there were far fewer leukocytes in the exudate. The development of connective tissue also was observed, in the form of loose adhesions containing many plasma cells, and also dense adhesions (Fig. 1f-h). The vitreous body also was infiltrated with plasma cells, eosinophils, and macrophages. Later (after 1-2 months) a mild plasma-cell reaction could still be observed and the sclerotic changes were increased in severity: denser adhesions between the lens and retina, thickening of the membranes and blood vessel walls.

This morphological study of rabbits' eyes thus showed that after injection of *M. pneumoniae* into the internal cavity of the eyeball an acute inflammatory process develops and affects all membranes of the eye — panophthalmia, spreading to the optic papilla. A character-

istic feature of the process is the presence of a marked plasma-cell reaction and the gradual development of sclerotic changes.

LITERATURE CITED

1. H. Arm, R. Woolridge, E. Cheng, et al., *Am. J. Ophthalmol.*, 52, 1125 (1966).
2. E. J. Bass, S. L. Trotter, R. M. Franklin, et al., *Infect. Immun.*, 18, 806 (1977).
3. J. D. Cherry, E. S. Hurwitz, and R. C. Welliver, *J. Pediatr.*, 87, 369 (1975).
4. H. Harwick, R. Purcell, J. Bruce, et al., *J. Infect. Dis.*, 121, 260 (1970).
5. D. Jones and B. Tobin, *Br. Med. J.*, 1, 467 (1968).
6. M. Kunishi, *Acta Soc. Ophthalmol., Jpn.*, 77, 1204 (1973).
7. E. Langford, *Can. J. Comp. Med.*, 35, 18 (1971).
8. D. Pavan-Langston, *Arch. Ophthalmol.*, 82, 245 (1969).
9. M. J. Prentice, G. R. Hutchinson, and D. Taylor-Robinson, *Br. J. Ophthalmol.*, 61, 601 (1977).
10. C. Reh binder, *Acta Vet. Scand.*, 18, 65 (1977).
11. S. Richter, A. Vogel, and G. Schabinski, *Dtsch. Gesundheitswes.*, 30, 63 (1975).
12. P. Surman, *Aust. J. Exp. Biol. Med. Sci.*, 51, 589 (1973).
13. S. Trotter, R. Franklin, E. Baas, et al., *Infect. Immun.*, 18, 816 (1977).