Reports

Mycoplasma pneumoniae: Proposed Nomenclature for Atypical Pneumonia Organism (Eaton Agent)

Previous epidemiologic studies have shown that most primary atypical pneumonia illnesses in which cold agglutinins develop are associated with the agent first described by Eaton, Meiklejohn, and van Herick in 1944 (*1–8*). In addition the agent causes a spectrum of effects ranging from inapparent infection to febrile respiratory disease without pneumonia (*5, 6*).

Recent studies have established that the organism, previously known as "primary atypical pneumonia virus" or "Eaton agent", is not a virus but a member of the genus *Mycoplasma* (pleuropneumonia-like organisms) (*9–11*). Thus, at least 30 strains have been grown in cell-free semisolid or liquid medium containing bovine heart infusion, yeast extract, and horse serum (*10–13*). Growth does not occur in the absence of serum or a suitable substitute such as egg yolk (*10, 14*). The colonies which grow on semisolid agar medium exhibit a colonial morphology and fine structure characteristic of *Mycoplasma* (*10*). Certain microbial inhibitors such as thallium acetate, penicillin, and amphotericin B do not affect growth of the organism (*10, 11*). The agent is inhibited, however, by the tetracycline group of antibiotics (*15*).

Until recently only four species of mycoplasma were known to infect man. These are *M. hominis* type 1, *M. hominis* type 2, *M. salivarium*, and *M. fermentans*. (*16–18*). When the atypical pneumonia organism was compared with these species by immunofluorescence or complement-fixation tests it was antigenically distinct (*10, 19–21*). It resembles *M. fermentans* in utilizing glucose and other sugars (*22*). The agent differs biologically from the four recognized human species of Mycoplasma by its ability to produce rapid and complete hemolysis of guinea-pig and horse red cells (*23, 24*). Under identical conditions of testing *M. hominis* type 1, *M. hominis* type 2, *M. salivarium*, and *M. fermentans* produce only delayed partial hemolysis of guinea-pig erythrocytes (*24*).

In view of the distinct antigenic and biologic properties of the atypical pneumonia agent, it would seem appropriate to classify it as a distinct species of *Mycoplasma*. We propose the name *Mycoplasma pneumoniae* to connote its relationship to atypical pneumonia.

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Flicker Fusion Frequency of Electroretinogram in Light-Adapted Goldfish at Various Temperatures

Abstract. *The light intensity-fusion frequency relationship of the goldfish electroretinogram follows the Ferry-Porter law except at the higher intensities. Maximum fusion frequency increases with temperature thus contradicting the results of studies elsewhere on the behavioral responses in sunfish.*

Terrestrial vertebrates have been the subjects in most studies of flicker electroretinogram (ERG). In man (*1*), cat (*2*), guinea pig, and pigeon (*3*) the ERG flicker fusion frequency increases linearly with the logarithm of

stimulus light intensity (Ferry-Porter law). In the carp eye, the frequency at which response amplitude (peak to peak) became half of the maximum, increased not only with the light intensity but also with the temperature (*4*).

In a study of flicker and fusion of intraretinal slow potentials with microelectrodes on the inverted carp retina, Motokawa *et al.* found that the maximum fusion frequency was higher with increasing temperatures (*5*). These observations suggest that temperature is another factor controlling fusion frequency in poikilothermic animals. We have studied the influence of temperature on ERG flicker fusion frequency in goldfish (*Carassius auratus*).

Three temperatures (5°, 15°, and 25°C) were chosen and in each, six to seven fish (10 to 12 cm long) were used. The fish were acclimatized to the temperature (± 0.2°C) for at least 48 hours. Light-adapted fish, anaesthetized with 1 percent urethane, were wrapped in gauze which was in turn pinned to the paraffin-coated bottom of a square plastic dish. A solution of 0.3 percent urethane from a bottle was kept flowing into the fish's mouth through a rubber tube. The temperature of the fish, which was measured under the operculum with a thermister thermometer, was maintained by adjusting the temperature of the solution as well as by controlling the flow through the tube. Throughout an experiment the temperature did not vary more than ± 0.5°C. A small puncture was made in the cornea and a silver–silver chloride electrode, in the form of a thin strip less than 1 mm wide, was inserted in the vitreous cavity. The eye was kept well above the water level. The reference electrode of the same type was placed in the nostril. All fish survived the experiments and appeared normal. The retinal potential was led off through a condenser-coupled preamplifier (Tektronix type 122; time constant 1 second) to the upper beam of an oscilloscope (Tektronix type 502). Light and dark durations as well as time marks (5 msec) were fed into the lower beam. Both the beams were recorded on a continuously moving 35-mm film.

A Leitz projector with a 500- or 750-watt tungsten bulb was the source of light. A convex lens in front of the projector concentrated the light beam

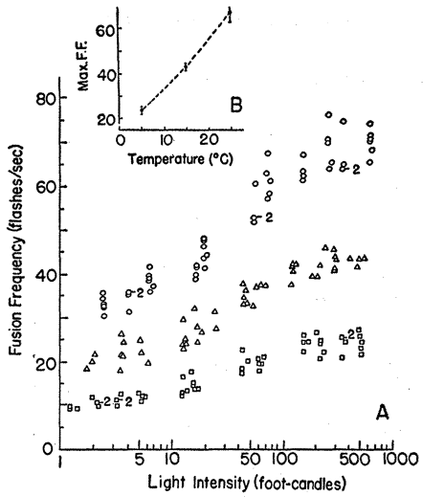

Fig. 1. *A*, Relationship between the stimulus intensity and ERG-fusion frequency in the fish used at the three temperatures indicated. Nine eyes from six fish were used at 5°C; nine eyes from five fish at 15°C; ten eyes from seven fish at 25°C. *B*, Averaged maximum fusion frequency values plotted against temperatures. The circles, triangles, and squares in the figure represent the eyes tested at 25°, 15°, and 5°C, respectively. The vertical bars indicate standard deviations.

on the sectored disk (light:dark::1:1). This light beam was made parallel by passing it through another convex lens placed next to the sectored disk. Parallel rays thus obtained were reflected by a mirror onto the fish's eye. Filters made of photographic plates exposed to various quantities of light were placed next to the second convex lens in order to reduce light intensity. Light intensities were measured at the corneal surface. Since the pupil of the goldfish eye is immobile it may be safely assumed that the quantity of the light impinging on the retina varies in direct proportion to the intensity of the light striking the cornea. Flicker light was obtained by the rotation of the sectored disk which was driven by a motor controlled by a variable transformer.

The fusion of the flicker electroretinogram was read from the upper trace of the record and the fusion frequency was read from the corresponding part of the lower trace which bore stimulus and time marks. Each experiment was repeated at least twice. The results were consistent; the variation was less than 6 per second at 25°C and 3 per second at 5° and 15°C. The measurements at each intensity for each eye were averaged. The fusion frequency was determined at five or six different intensities ranging from a few foot-candles to several hundreds of foot-candles.

The results obtained from nine to ten eyes at each of the three temperatures are summarized in Fig. 1*A*. The relationship of fusion frequency to light intensity follows the Ferry-Porter law, as was expected, except at the higher intensities where fusion frequency tends to remain stable.

The light intensity at which fusion frequency reaches the maximum falls within the range of 100 to 250 ft-ca at each of the three temperatures, and it appears to be higher with increasing temperatures (Fig. 1*A*). Within the range of the higher light intensities, there is no definite decrease in fusion frequency with increasing light intensities (after a maximum is reached), as has been observed in the case of man (*1*).

When the flicker-fusion values obtained at light intensities higher than 250 ft-ca are averaged for each temperature, they are 67.2 ± 4.2 per second at 25°C, 43.4 ± 1.3 per second at 15°C, and 24.4 ± 1.9 per second at 5°C (Fig. 1*B*). It is evident that the relationship between temperature and maximum fusion frequency is almost linear within the range of temperatures used. In the case of sunfish (*Enneacanthus*), Crozier *et al.* (*6*), during a study of behavioral response wherein the fish was made to follow a moving striped screen, observed no dependence of maximum fusion frequency on temperature. They found that maximum fusion frequency, about 50 per second, was the same at each of the three temperatures, 12.4°, 21.5°, and 27.3°C. It appears worth while to obtain the flicker fusion values from this fish with electroretinography and compare the results (*7*).

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References and Notes

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