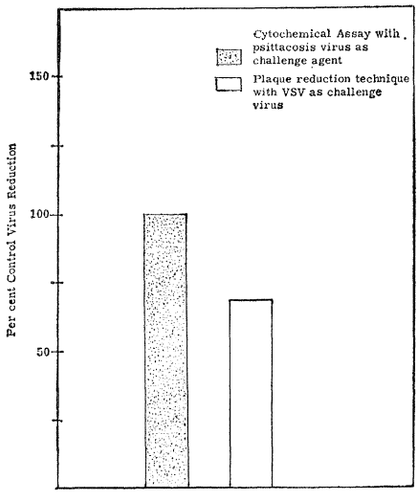

Fig. 1. Comparison of methods showing effect of DHV-interferon on challenge viruses.

strain psittacosis virus (*7*) was pooled, ampouled, and stored as stock virus at −40°C. Duck hepatitis virus was assayed by methods described previously (*6*).

Primary cell cultures were prepared from 11-day-old chicken embryo tissues either by the trypsinization procedure or in the form of explants on cover slips in Leighton tubes. Psittacosis virus was assayed on McCoy cell monolayer preparations on cover slips (*8*). Nutrient fluids for the tissue cultures consisted of Mixture 199 supplemented with 0.5 percent lactalbumin hydrolysate, 10 percent heat-inactivated calf serum, and 100 μg streptomycin per milliliter, adjusted to *p*H 7 with sodium bicarbonate.

Fluids with interferon activity were prepared in cultures of chicken embryo tissues which had been inoculated with viable DHV, and in other tissues which were inoculated with heat- or ultraviolet-inactivated DHV, plus viable DHV. After fluids from the tissue culture preparations had been rendered noninfectious by heat, they were examined for interferon by plaque assay with vesicular stomatitis (VSV), with Western equine encephalomyelitis (WEE), and with Eastern equine encephalomyelitis (EEE) viruses. Control cell cultures were treated with fluids prepared in normal chick embryo cells.

Interferon produced in response to DHV caused a significant reduction of VSV, WEE, and EEE virus activity as determined by the plaque assay technique. All interferon preparations caused more than 50 percent reduction of virus. The interferon was destroyed by trypsin but not by ribonuclease and deoxyribonuclease. Interferon activity was not significantly affected either by DHV antiserums prepared from chickens and rabbits, by serum from normal chickens, or by psittacosis antiserum prepared in rabbits. Interferon activity was destroyed by heating at 100°C for 15 minutes and at 80°C for 1 hour, but not at 56°C for 6 hours. Treatment of fluids by freezing, ultrasonic vibration, or ether reduced the interference effect. Centrifugation at 90,000*g* for 2 hours or dialysis at *p*H 2 resulted in no appreciable change of activity. Interferon was stable when stored at 4°C for approximately 4 months. To test for a direct extracellular virus-inactivating effect of the inhibitory agent, DHV-interferon was incubated with vesicular stomatitis virus and with psittacosis virus for ½ hour at 37°C and tested by the plaque reduction method and by the cytochemical assay procedure. Neither of the two viruses was thereby inactivated.

After it was proved that the virus-inhibiting agent is an interferon-like substance, its effect on psittacosis virus was demonstrated in two steps. First, interferon and virus were added to cultures of chick embryo tissue cells and 40 hours later the cells were examined for mature virus by fluorescence microscopy (*3*). Second, duplicate tissue cultures were frozen once and assayed for viable psittacosis virus on monolayer cultures of McCoy cells (*8*).

Interferon interrupted psittacosis, virus for ½ hour at 37°C and stage of replication. Examination of tissues after 40 hours of incubation revealed cells with virus at "red ball" stage. However, some mature virus was found if inhibition was not complete. Since the "red balls" are noninfective, only mature virus was detected in the subsequent assay. It is probable that the cells with "red balls" had absorbed interferon. Quantitative interference was demonstrable when the inhibitory agent was added to cells simultaneously with or 3 hours prior to the addition of virus (Tables 1 and 2). When the addition of virus to interferon-treated cells was delayed, there was no significant difference in virus production. Each of five DHV-interferon preparations significantly inhibited the maturation of psittacosis virus in the challenge inoculum. Figure 1 shows a comparison of interferon effect as determined by the plaque reduction and by the cytochemical assay techniques. The microscopic assay method here described provides a sensitive, quantitative, visible cytochemical indicator system, which reflects the stage at which interferon interrupts replication of the virus (*9*).

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Binasal Hemianopia as an Early Stage in Binocular Color Rivalry

Abstract. *Fifty years ago Köllner reported that the initial fleeting sensation in binocular color rivalry is a bipartite color field such that the color presented to the left eye appears to the left of the color presented to the right eye. A method is described for maintaining such quasi hemianopia for long periods of time.*

What will be seen when discrepant stimulation is applied to corresponding parts of the two retinas? Woodworth addressed this question and outlined the responses he felt the brain makes to such a conflict of cues: "It might disregard one retina and respond only to the other; or it might respond to the combination in several ways: by fusion of the monocular fields, by seeing one through the other, or where possible, by getting a depth effect." (*1*). Generally, the well-accepted notion of the binocular relation is that when the monocular stimuli cannot merge to

form a single, integrated percept, and when the stimuli before one eye do not dominate completely, the left-eye view alternates over time with the right-eye view. This is generally granted even when the neuroanatomy of the hemidecussating human visual system is explicitly recognized and the assumption has to be made that in some unknown way each eye remains a separate functional unit as it contributes to the binocular result (*2*).

This concept of the binocular relation is not completely correct. The facts which it ignores were reported half a century ago, but, so far as we know, they appear in no modern treatment of the problem. H. Köllner, at Liepzig, was interested in nasal-temporal differences in vision. He recognized that the temporal fields are larger than the nasal fields in man, and asked whether they might be predominant even in the mutual visual field. His paper reported observations of binocular color rivalry (*3*). It is well known that when one eye is shown one color while the other eye is shown a spatially congruent different color, the two colors will either fuse into one, or one color will alternate with the other over time. However, Köllner noted that the initial sensation was of a bipartite field of color, whereby the color before the left eye appeared to the left of the color before the right eye. That is, at first, sensation corresponds to stimulation from the temporal visual field only; this suggested to Köllner predominance of the crossed fiber visual afferent system.

Köllner's method is very simple. A red glass is held before the left eye and a blue glass is held before the right eye. When the eyes are opened one fixates the center of a white surface. One sees red to the left of fixation and blue to the right of fixation.

Since rivalry or fusion quickly takes the place of the initial sensation of the bipartite color field, some practice may be necessary in observing the phenomenon. We have found it easier to observe if the eyes are open only a moment. We came across Köllner's paper after completing a tachistoscopic study of binocular color rivalry in which we found that the most common sensation at a duration of exposure of 100 msec is a bipartite color field where the stimuli in the nasal visual field are not seen. This can be taken as a replication of Köllner's effect (*4*).

We have also found that when a thin strip of black tape is placed vertically down that part of each glass corresponding to the fovea, and fixation is maintained so the strips are seen as one, the colors nasal to the strips are not seen at all for several minutes. By this simple method an apparent binasal hemianopia is established in the color fields, similar to that occurring initially, but allowing study for prolonged periods. Rotation of the strips changes the spatial characteristics of the color field, which now remains bipartite in nature, generally without fusion of the colors over the whole field or suppression of one eye. When the strips are placed horizontally, then rivalry or fusion does occur.

The immediate purpose of this communication is to call attention to Köllner's effect. It must play a role in an adequate description of the binocular relation. The usual question has been what the brain can do when discrepant stimuli are presented to corresponding areas of the two eyes. The observations reported here represent an unexpected answer. The puzzling questions are these: what is the mechanism which controls initial suppression of the nasal fields, and why is the sensation of a bipartite color field prolonged when the strips are presented? The further puzzling question of the means by which one whole eye later comes to be suppressed also remains unanswered (*5*).

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5. The possibility that eye movement is implicated in the shift from processing based upon the distinction between nasal and temporal fields to processing based on the distinction between the left and the right eye is attractive, and is discussed (*4*).

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Vascular Smooth Muscle: Dual Effect of Calcium

Abstract. *The first part of the contractile response of rabbit aorta to epinephrine is depressed by elevation of calcium concentration; the second is potentiated. These observations suggest that the rate-limiting factor for the former is membrane excitability (depressed by increased calcium), while that for the latter is the role that calcium plays in coupling membrane excitation with the development of tension by the contractile protein (a function that is augmented by increased calcium).*

Increases in calcium concentration may either depress (*1*, *2*) or augment (*3–5*) the contractile response of vascular smooth muscle. The unique finding of the current study is that within a single contraction of this muscle both effects may be evident: one component of the response is depressed while another is potentiated. From information available about specific subcellular actions of calcium, this observation permits an analysis of the rate-limiting factors of the two components of the total response of vascular smooth muscle.

Helical strips of rabbit aorta (*6*) were mounted in phosphate-buffered Krebs solution, aerated with 100 percent oxygen, and maintained at 38°C. Isometric contractions in response to epinephrine were recorded for 5 minutes. The epinephrine was then rinsed from the bath and the muscle was allowed to relax to its rest tension before it was stimulated again.

The total contraction of vascular smooth muscle in response to epinephrine is differentiable into a fast (F-) component and a slow (S-) component (*7*). The former is completed within 45 to 60 seconds after the initial stimulation; the latter may progress throughout the remainder of a 20-minute observation period. In the current study variations in calcium concentration in the medium influenced differentially the two parts of the response to epinephrine.