do not appear, as a means of eliminating the misleading effects to which they refer. This program has in fact already been carried out by Herget and Musen (*4*) and forms the basis for the Vanguard orbital calculations. Second, the distribution of the Minitrack stations is, as pointed out by the Stanford Research Institute group, concentrated along the 70th meridian. However, the location along the meridian does not imply a bias favoring a particular portion of the orbit, as they suggest. The rotation of the earth actually spreads the successive observations out along the orbit at very reasonable intervals of about 35 degrees.

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Colors of All Hues from Binocular Mixing of Two Colors

Abstract. Land has recently studied the perception of colors resulting from appropriate mixtures of two colors or of one color and light from an incandescent lamp. In an "image situation," colors of all hues may result from such mixtures. The findings presented demonstrate that the mixing which Land accomplished by superimposing two projected images on a screen can be achieved when the two color separation images are presented simultaneously but separately to the two eyes.

The problem of binocular fusion of colors has interested investigators since Hecht's demonstration in 1928 that presenting red to one eye and green to the other led to a subjective sensation of yellow (*1*). Hurvich and Jameson (*2*) confirmed these results; it is today generally accepted that such fusion is readily obtainable in most subjects.

Land (*3, 4*) has recently considerably extended the early work of Fox and Hickey (*5*) and of Bernardi (*6*) on colors resulting from mixtures of two colors or of one color and light from an incandescent lamp. In the "image situation" (that is, a complex array of natural objects), colors of all hues may result from such mixtures. We decided to study the question of whether or not such mixing occurs when the two color separation images were presented simultaneously but separately to the two eyes.

Our experimental procedure followed Land's closely, deviating primarily in the technique of viewing. A complex scene was photographed on Kodak 35-mm direct positive film through various Kodak Wratten filters. Pairs of positive transparencies were selected in which the scale of grays was complete. The positives were then viewed in a Kodak stereoscopic viewer (however, the pictures used were not stereo pairs) with appropriate filters place in each half. Thus, in a typical experiment a scene was photographed through a Kodak Wratten filter No. 29 (red) and through a Kodak Wratten filter No. 58 (green). The black and white positive photographed through the red filter was placed on the left with a No. 29 filter and the positive photographed through the green filter was placed on the right with either a No. 58 filter or with no filter at all. A pair of crossed polarizing screens (Kodak Polascreen) placed on the brighter side was adjusted for optimum color. The brightness control of the viewer was then adjusted for maximum color saturation.

Under these conditions of binocular mixing, as full a range of colors was seen as had been obtained by projecting the two images on a screen, as in Land's experiments. If the filters were interchanged, "color reversal" occurred (that is, greens appeared as reds and vice versa).

The balancing of brightness in the two images is of critical importance since, otherwise, many subjects have great difficulty in fusing the colors, seeing predominantly with one eye. This effect varies from subject to subject, presumably because of varying degrees of retinal rivalry. Retinal rivalry probably also explains the fact that the perception of the colors may vary in time, in contrast to their constancy when projected and superimposed.

Under the conditions of this experiment, the perception of colors of all hues from two-color mixtures cannot be a purely retinal effect but must involve the interaction of higher centers.

Students of simple binocular color mixing have tended to explain their experiments in terms of color mixing at some level higher than the retina (*1*) or as the central "cancellation" of the hues not common to the two eyes, leaving the hue common to the two eyes to be perceived centrally (*2*). Another equally acceptable explanation is that the images in each eye initiate reflexes at higher levels whose efferent limbs modify the response of the opposite retina. Because of the possibility that this explanation is correct, it cannot be excluded that under some conditions the perception of colors of all hues from two-color mixture is a retinal effect, or that parallel mechanisms are present in the retina and higher centers (*7*).

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Interspecific Transformation of Neisseria by Culture Slime Containing Deoxyribonucleate

Abstract. Genetic change of *Neisseria meningitidis* is elicited by deoxyribonucleate preparations obtained from *N. sicca*. Such interspecific transformation is effected not only by deoxyribonucleate obtained from cells by conventional methods but also by crude deoxyribonucleate-containing slime which accumulates without experimental intervention in some cultures incubated for a period as short as 44 hours.

Deoxyribonucleates (DNA) of high molecular weight are recognized as determinants of bacterial heredity (*1*). Deoxyribonucleate which has been extracted from donor bacteria after lysis by added deoxycholate or other lytic agents, and extensively purified, elicits heritable change (transformation) when applied in minute quantities to suitable recipient bacteria. The genetic changes which have been studied affect numerous properties of the bacteria, including virulence, specificity of antigens, cellular and colonial morphology, resistance to various antibacterial agents, and capacity to utilize certain compounds for nutritional purposes (*1, 2*). Accumulated evidence led Hotchkiss (*1*) to the conclusion that the transforming DNA contains biologically specific entities operationally equivalent to bacterial genes.