round. Our procedure was the threshold method of limits with wedge steps of 0.05 density. A complete curve was obtained each session, greatly reducing variability over previous studies which have explored only parts of the curve in single sessions.

Each point in Fig. 1 is the average of 24 threshold determinations combined from two observers. Superimposed on the dimmer (5.3 trolands) white surround curve (Fig. 1*a*) is shown the threshold curve obtained by Sperling and Lewis (*6*) for a completely dark surround by the same techniques. It is clear from this comparison that the secondary peak is reduced to a shoulder in the presence of the light surround, while the main peak retains almost the same shape up to 580 mμ where the second peak begins. The brighter white surround (800 trolands) in Fig. 1*b* shows an additional feature. A hump appears between 560 mμ and 590 mμ, which was never seen in the Sperling and Lewis dark surround data. It is clearly a regular feature of light surround data, as shown by a glance at *b, c,* and *e* of Fig. 1.

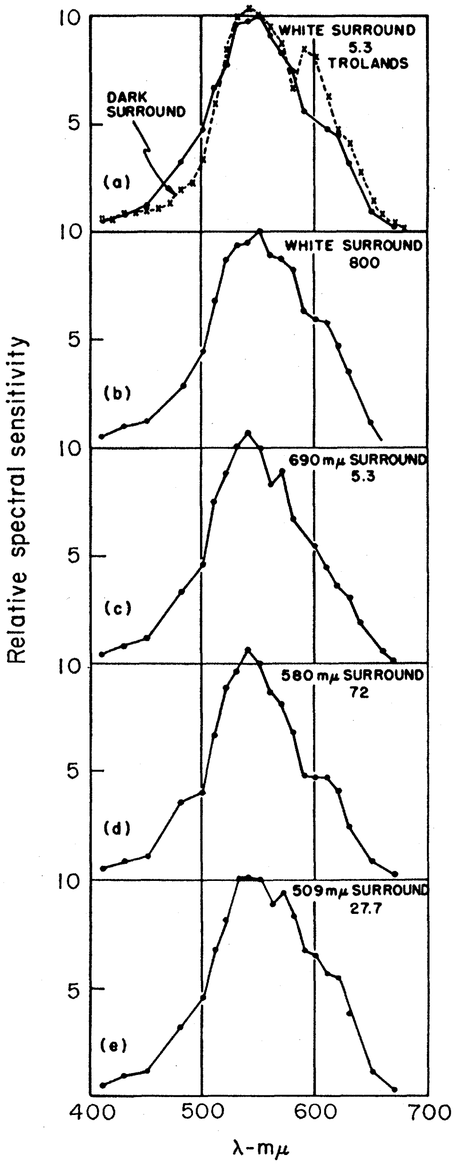

Fig. 1. Relative spectral sensitivity of the fovea for different conditions of surround adaptation: *a*, 5.3 troland white; *b*, 800 troland white; *c*, 5.3 troland 690 mμ red; *d*, 72. troland 580 mμ yellow; *e*, 27.7 troland 509 mμ green. Superimposed on *a*, as shown by crosses and dashed line, are the results obtained by Sperling and Lewis (*6*) with a completely dark surround.

Figure 1*c* shows the effects of red adaptation. The shoulder seen with the white surround from 590 to 670 mμ almost completely disappears, as had been found by Stiles and Crawford (*4*). The hump at 560 to 590 mμ becomes a more distinct peak. Of great interest is the fact that with a narrow waveband surround from the yellow region (580 mμ) the hump at 560 to 590 mμ is practically eliminated (Fig. 1*d*), while the shoulder at 590 to 670 mμ remains and is possibly exaggerated. In Fig. 1*e* are shown data taken with a 509 mμ narrow-band green surround. Here both the 560 to 590 and 590 to 670 mμ humps are retained. The main peak, however, appears somewhat reduced in the region of 540 mμ.

Our results thus indicate the presence of three humps or peaks in the green through red regions of the spectrum, one at 540 to 550 mμ in the green, one at 560 to 590 mμ in the yellow, and one from 580 to 590 mμ through the extreme red end of the spectrum. The "green" peak is slightly reduced by adaptation to the 509 mμ surround; the yellow is virtually eliminated by adaptation to 580 mμ; and the red, by adaptation to 690 mμ. Thus we have not only shown that the humps in the green-to-red part of the spectrum exist and are repeated from one set of data to another on the same observers, but also that they are produced by underlying processes which have maximum sensitivities at different places in the spectrum, since we can reduce or eliminate them by adaptation to narrow wavebands from those regions without any appreciable effect on the adjacent processes.

We conclude that it is most likely that the spectral sensitivity or luminosity function is a combination of the overlapping sensitivity functions of different chromatic receptor groups which appear to greater or less degree as humps in the composite curve. Of additional interest, it is probable that the dark-adapted sensitivity of the yellow process is lower. Hence, the yellow (560 to 590 mμ) hump does not appear at dark or dim surround levels but appears when brighter adaptation levels force more intense stimuli in order to reach threshold.

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Dilute Locus and Audiogenic Seizures in Mice

Abstract. Evidence which indicates a positive relationship between susceptibility to audiogenic seizure and dilute coat color in mice is presented, and a possible mechanism for this relationship is discussed.

Susceptibility to audiogenic seizures has been demonstrated in mice with various coat colors. The character appears to be controlled by a quantitative genetic mechanism (*1*), and it is also influenced by many environmental conditions (*2*). Recently an analysis by Coleman (*3*) of biochemical activity of alleles at the dilute locus in various mouse strains has provided a plausible basis for implication of this locus with seizure susceptibility as well as coat color. He has demonstrated decreased phenylalanine hydroxylase activity in mice with dilute phenotypes. The reduced activity results in inhibition of tyrosine production and in formation of abnormal breakdown products from the accumulated phenylalanine. These products are inhibitors of decarboxylase reactions, including those concerned with the production of serotonin and γ-aminobutyric acid, compounds thought to be involved in normal brain metabolism. Therefore Coleman suggests that the influence of the dilute gene on phenylalanine hydroxylase activity may affect a neural mechanism, such as that postulated by Fuller and Smith (*4*), involved in seizure susceptibility. Our report supplies information regarding the relationship between dilute coat color and audiogenic seizure susceptibility in mice.

The strains most commonly used for comparisons of audiogenic seizure susceptibility (DBA/1 and C57BL/6) were not available where we performed the experiments (*5*). A testing program (with "standard" equipment, that is, a doorbell and metal bucket) revealed two alternative strains which were suitable for comparison (*6*). Susceptible individuals were found among mice of strain P, and a subsequent selection program increased their frequency. A related strain, J, produced no susceptible mice among over 500 tested. Like DBA, the P strain is homozygous for the recessive gene dilute; the J strain does not carry this allele. All mice used in crosses were first tested and classified, so that all P parents were known to be susceptible, and all J parents, nonsusceptible.

Mice from crosses resulting in segregation of coat color phenotypes (F_2 and backcrosses to P) were tested for seizure susceptibility. Each animal was given a single 1-minute exposure to sound at 35 to 40 days of age. Mice showing convulsive behavior were classified as susceptible.

As expected, all four possible categories of mice occurred: dilute-susceptible, dilute-nonsusceptible, nondilute-susceptible, and nondilute-nonsusceptible. Among the total number of mice tested, the dilute phenotype occurred in frequencies which conformed closely to the theoretically expected frequencies of .25 (F_2) and .5 (backcross) (Table 1). However, among the susceptible animals from both crosses, the frequencies of the dilute phenotype were greater than expected. Tests of independence between the two factors, coat color and susceptibility, were made (Table 2). Failure to detect all susceptible individuals would tend to bias the results toward an incorrect conclusion only if the factors are dependent, since in this case a higher proportion of dilute than nondilute animals would be shifted to the nonsusceptible classification, and the only ratio which would remain unchanged (susceptible-dilute: susceptible nondilute) would be based on fewer observations. The combined chi-square value indicates that mice with the dilute phenotype are more likely to be susceptible than are nondilute mice. The higher probability of a chance contingency indicated by the backcross data may be due to the smaller number of animals in this group. Also, nondilute mice among the backcross progeny consist entirely of heterozygotes, whereas in the F_2, on the average, one-third of the nondilute animals are homozygous for the nondilute allele. Coleman's data indicate that alleles at the dilute locus tend to behave in an additive manner. Therefore, if their action does influence the incidence of seizures, nondilute homozygotes might be less prone to seizures than heterozygotes.

Table 1. Frequencies of dilute phenotype among all progeny and among susceptible progeny only.

Generation	Total progeny		Susceptible progeny	
	No.	Frequency of dilute	No.	Frequency of dilute
F_2	236	.25	26	.42
Backcross	112	.53	27	.67

Table 2. Chi-square values from tests of independence between dilute coat color and seizure susceptibility.

Generation	χ^2	d.f.	*P*
F_2	4.668	1	$<.05$
Backcross	2.404	1	$<.20$
Combined	7.072	2	$<.05$

Although linkage of a factor affecting susceptibility with the dilute locus cannot be ruled out, the relationship between phenylalanine hydroxylase activity and dilute alleles provides a mechanism through which direct influence on audiogenic seizure susceptibility is possible.

The animal stocks used in this investigation do not offer the best approach to this problem, because: (i) interstrain crosses result in segregation at loci other than those under investigation; (ii) the P strain carries the gene for short ear, which is very closely linked to dilute; and (iii) crosses between strains P and J yield a smaller proportion of animals susceptible to audiogenic seizures than do crosses involving the DBA strain. Further research, which will eliminate these difficulties, is now underway, through utilization of a mutation from dilute (*d*) to dense (*D*) which occurred in the DBA strain and was used by Coleman in his biochemical analysis. Tests of the incidence of seizures among *DD*, *Dd*, and *dd* individuals on a common genetic background, and experiments to determine whether or not this incidence can be altered by treatment with chemicals which are involved in the metabolic activities related to the dilute locus are expected to clarify the role of the alleles at this locus in influencing the incidence of audiogenic seizure susceptibility in mice (*7*).

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5. This project was carried out while we were located at the Department of Genetics, Iowa State University, Ames.
6. Both strains were obtained from Dr. W. F. Hollander, Iowa State University.
7. This work has received assistance from the U.S. Atomic Energy Commission, contract No. AT(11-1)107 at Iowa State University.

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Sedimentary Rocks of the Buckeye Range, Horlick Mountains, Antarctica

Abstract. In the Buckeye Range of the Horlick Mountains, 4000 feet of sedimentary rocks nonconformably overlie a granitic basement and underlie a thick diabasic sill. The sedimentary section consists of Devonian sandstone and shale (Horlick formation), Carboniferous (?) tillite (Buckeye formation), Permian (?) platy and carbonaceous shale (Discovery Ridge formation), and Permian arkose, shale, and numerous coal beds (Mount Glossopteris formation). This apparently is the first report of a Paleozoic tillite in Antarctica.

This paper names and presents a preliminary report on the stratigraphic units of the Buckeye Range (Fig. 1) which will serve as a basis for further geologic investigation in this area. The Buckeye Range is the proposed name for the central range of the Horlick Mountains, located about 5° from the South Pole at 84°45′ S and 114° W. This section seems more complete than the sections of other antarctic areas, and it shows a greater degree of resemblance to the Gondwana age deposits of Australia, India, South Africa, and South America. The most notable feature involves recognition of a thick section of late Paleozoic tillite.

Nearly all rocks are flat-lying or of