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## The Spectral Distribution of Erythemal Effectiveness of Ultraviolet Radiation

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THE SPECTRAL DISTRIBUTION OF ERYTHEMAL  
EFFECTIVENESS OF ULTRAVIOLET RADIATION

GEORGE E. DAVIS

During the last twelve years several determinations of the distribution of erythema effectiveness of radiation in the spectral region extending from wave-length 2400 or 2500 A. to about 3400 A. have indicated maximal effectiveness at 2967 A. However, all the investigators using monochromatic radiation employed the mercury vapor arc as source, so that their observations necessarily were limited to those wave-lengths represented by fairly intense lines of the mercury arc spectrum. These lines are not close enough together to allow accurate determination of the curve of erythema effectiveness. Maximal effectiveness was assumed to be at 2967 A., its spectral position being roughly indicated by measurements at that wave-length and at wave-lengths no closer than 2925 and 3024 A.

We have investigated the shape of the curve in the spectral region between 2955 and 3080 A., using solar radiation and a very large, specially built quartz monochromator. The radiation was focused onto a small area of untanned skin on the inner side of the upper arm. The intensity of the radiation was measured with a thermopile. It was found that the curve of erythema effectiveness has a "fine structure" in the spectral region studied, the bands being superimposed upon the smooth curve located by earlier observers. Four maxima were found, located approximately at wave-lengths 3045, 3012, 2988 and a little beyond 2955 (probably at about 2945) A. The absolute maximum is at about wave-length 2988, not at 2967 A. Although the reactions of only one individual were studied, it is more than probable that the curve of erythema effectiveness will be found generally to have this type of fine structure, although the exact shape of the curve will vary for different individuals and, probably, for different areas of skin of the same individual.

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