Letters

Radiation Exposure Records of Personnel

In a previous letter [*Science* **140**, 770 (1963)] I expressed some concern about the importance attached to radiation exposure records of questionable validity. Because the subject aroused keen interest, I am prompted to draw attention to another practice of doubtful value.

Many regulations and the policies of many organizations require that the slightest detectable radiation exposure, even though it be far below the permissible maximum, be permanently noted in the record of the exposed person. Such small dose records must be accumulated and tabulated at the end of specified accounting periods, even though the biological scientists who were chosen to set these limits usually regard such exposures as of little consequence. In 1954 the National Committee on Radiation Protection recommended that the maximum permissible dose be set at 300 millirems per week. "Maximum permissible dose" was defined (in Handbook 59) as the dose of ionizing radiation of such magnitude that exposure at the proposed rate limit for an indefinite period of years is not expected to cause appreciable body injury to a person at any time during his lifetime. In 1957, the recommended limit was reduced by an additional safety factor of 3. It was stated that the change was due not to any evidence of damage at the earlier permissible dose but to the desire to accord with the trends of scientific opinion. It was also stated that the risk in not introducing the additional factor of safety was very small, if not negligible. Although the report does not say so, conversations with members of the committee indicated quite clearly that the principal scientific trend being considered stemmed from the new evidence supporting concern for the long-range genetic effects of population exposure.

All this would appear to indicate that those who have devoted many years to the study of this subject believe that exposures below the recommended limit, even the former higher limit, should be of little concern to the exposed individuals. Moreover, the International Commission on Radiological Protection states in its 1962 recommendations that "*for radiation workers of the last generation, exposed subject to the maximum permissible levels of that time, the risks of somatic effects are comparable with or less than those of the majority of other trades and professions, and would therefore be considered not unacceptable.*" If a generation is 30 years, the permissible level referred to is that of 1932, which was 0.2 roentgen per day, or about 60 roentgens per year, 12 times the currently used limit.

In current practice and in most regulations today, a person is considered to be overexposed if certain specified organs have received, over a period of a year, 0.13, 0.5, 5.0, 12, 30, or 75 rems of radiation, and under certain circumstances anywhere between 5 and 12 rems, depending upon his known exposure history. If one examines the reports of biologists' observations of radiation effects, upon which these limits have presumably been based, one wonders if such hair-splitting is justified. On the other hand, many industrial and laboratory workers are exposed to detectable and occasionally excessive amounts of radioactive dust, yet there appears to be little effort to compile records of cumulative exposures to contamination from such sources.

I suggest that where personnel monitoring is employed (and I repeat that personnel monitoring serves a very useful purpose), no attention should be paid to a measurement that falls below the level set by the experts. If, on the other hand, the record shows an exposure in excess of the guidelines, an investigation should be made to estimate the dose the person actually received and to prevent repetition. In defense of the proposal that a measurement described as "of questionable validity" be discarded, it should be noted that where the error is likely to be significant it is invariably on the conservative side.

We need only to look at some of the laws that have been drafted (but fortunately not enacted) regarding workmen's compensation for technical overexposures to realize that many of the nonscientists involved in these matters do not appreciate their insignificance. The many technical and clerical man-hours and the equipment and space now devoted to accumulating records which in the opinion of many experts have utterly no value could well be saved for better purposes.

HANSON BLATZ
New York City Office of Radiation Control, 325 Broadway, New York 10007

Aptitude and Achievement: Differences at the Top

In "Are aptitude tests valid for the highly able?" (4 June, p. 1297), Chauncey and Hilton relate the conclusion reached by Terman and Oden that differences in success by highly intelligent groups must be due largely to nonintellectual factors. But they neglect the important implications of this for the validity of their own conclusion that aptitude tests "can validly predict characteristics of the performance" of highly able individuals. And in commenting on French's study showing lack of correlation between verbal-aptitude scores and first-year grades of science and engineering students, they observe that "it is not verbal aptitude but mathematical aptitude that is important for achieving high levels of performance in science." How this "fact" was derived is not divulged.

My skepticism about the validity of aptitude tests as predictors of performance for highly able students or of the greater importance of mathematical-aptitude scores than verbal- for science students is based on a study I initiated in 1962 to compare the performances in first-year college physics of students who had taken the Physical Science Study Committee physics course and those who had taken the traditional high school physics course. Analysis of covariance was to be used, with the CEEB mathematical and verbal scores