do offer substantial support. Furthermore, two other methods had been used to remove the correlation between the ages of spouses, in order to check the result from the regression analysis. One of these, the path coefficient method of Wright, was explicitly mentioned.

It is charged that the data are not linear. This is not true. The data are linear in the only sense in which data can be said to be linear: the deviations from linearity are not statistically significant (despite the large sample size of more than 9 million births). However, it can be assumed that when more extensive data become available, the change in sex ratio with age, like biological phenomena in general, will prove to involve some nonlinear component. This may then be considered a logical extension and refinement, but hardly a refutation, of the linearity reported in my communication.

It is possible that differences in abortion rates contribute to the trend, even though Ciocco, whom Bernstein cites in another connection (see above), concluded that this cannot be the only factor [*Human Biol.* **10**, 36 (1938)]. No opinion was expressed on this question in my article.

No age effect of the approximate magnitude of that reported in my article, a decrease of seven male births per 10,000 births per 5-yr increase in age of the father, could possibly be demonstrated in the numerically small sample obtained from a 1935 German "Who's Who" and Radcliffe College Alumnae by Bernstein, despite the interest of her sample in other connections. However, I agree that the effects of different strata on results obtained from an analysis of combined data constitute an important and troublesome problem, one that should be circumvented where possible. Because of the great difficulty of obtaining sufficiently extensive selected data for testing the effects of parental age on sex ratio, it seems worth while to obtain as much information as possible from data that are actually available.

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Owing to an editorial oversight, Dr. Novitski unfortunately was not given the opportunity to see Marianne E. Bernstein's communication prior to its publication.

Geologic Controls of Lead and Zinc Deposits in the Goodsprings (Yellow Pine) District, Nevada

Lead-zinc ore of the Goodsprings (Yellow Pine) district typically occurs as flat pipes and tabular bodies replacing dolomitized limestone in zones of fracturing and brecciation. About 98 percent of the combined lead and zinc output has come from one formation, the Monte Cristo limestone of Mississippian age, which averages only 700 ft in thickness. Of the five members into which this formation has been subdivided—the Dawn limestone, Anchor limestone, Bullion dolomite, Arrowhead limestone, and Yellowpine limestone, named in ascending order—the Anchor and Yellowpine have been most productive, the latter having accounted for about 85 percent of the production. Because of the irregular surface of the unconformity separating the Monte Cristo limestone from the overlying Bird Spring formation of Pennsylvanian age, the Monte Cristo varies in thickness and, in some places, one or more of its members are missing.

The areal distribution of ore bodies is related to a complex pattern of faulting. The terrain is divided by thrust faults into imbricate blocks from 1.5 to 3 mi thick. These faults trend generally with the strike of the beds, but in most places their dip exceeds the dip of the bedding. Blocks bounded by the principal thrusts are intricately broken by smaller thrusts and high-angle faults, many of which apparently represent rifts and tears. Reefs of breccia border many faults, but the effects of brecciation and fracturing vary with the character of the beds involved. Massive limestone yielded to deformation largely by fracturing; thin beds, more by gliding and flowage. Thus, the Monte Cristo limestone, a comparatively massive unit between thinly bedded units, is complexly fractured at many places where the overlying Bird Spring formation remains relatively intact.

Chiefly because of this fracturing, the Monte Cristo limestone became the host for most of the ore bodies. Results of detailed studies of 17 mines suggest that the mineralizing solutions rose along conduits opened by intersection of faults and joints, or by differential movement along arcuate faults. Locally, the breccia along the feeding fissures was mineralized; more commonly the ore formed in permeable ground marginal to the fissures. The high permeability of the Monte Cristo limestone favored lateral spreading of fluids and sulfide replacement of limestone or dolomitized rock. In some places, the paths of maximum permeability were partings between beds or sandy fillings in old caves; more commonly they were zones of fractured ground along flexures or faults. Relatively impermeable bodies of mudstone and altered porphyry, as well as films of clayey gouge along thrust planes, locally contributed to the formation of ore by retarding upward progress of fluids.

Beneath some of these impermeable caps, the ore remains unaltered and consists principally of galena and sphalerite. In most places, however, the ore is oxidized to undetermined depths below present mine workings. Sphalerite has been altered to hydrozincite and calamine. Locally, the galena has also been altered —to cerussite or less commonly to anglesite—but mostly it remains as scattered pods and lentils in the oxidized ore. This common association of the primary lead sulfide with the secondary zinc carbonate and silicate indicates that the oxidation of primary ore was accomplished without significant change in position or shape of the ore bodies.

Prospecting in the district was begun in 1857. The peak of production was reached during World War I; after 1928, the district was virtually dormant until the outbreak of World War II. At the end of 1944, the output had reached a total of 93,000 tons of lead and 37,000 tons of zinc. By 1943, however, three out of every four lead-zinc properties in the district were too nearly exhausted to be productive, and the total production of lead and zinc together for 1943 and 1944 was less than 10,000 tons.

Although many ore bodies end downward in zones of high-angle faults, very few faulted continuations of the ore bodies exist because most of the faults are older than the ore. Prospecting should search along the conduits—either above or below ore bodies already mined.

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Landslide Investigations along the Columbia Valley in Northeastern Washington

Landslides occur in the surficial deposits along the upper Columbia River Valley with such great frequency that their consideration has become an important factor in relation to engineering developments and land utilization. Geologic investigations have been in progress since 1942 in an effort to develop criterions for predicting the probable amount of land that will be affected by sliding. The area of studies extends along the upper 200 mi of the Columbia River Valley in the state of Washington, reaching upstream from Grand Coulee Dam along Lake Roosevelt to Canada and downstream from Grand Coulee Dam along the Columbia River nearly to Chief Joseph Dam. Numerous fresh landslides in a relatively uniform physical setting present an unusual opportunity for a study of geologic processes and for a statistical analysis of landslide data. The application of statistical methods is believed to be a new approach to the study of landslides and the stability of natural slopes.

Early examinations revealed a wide variety in the size and shape of slides, and these differences seemed to reflect the particular geologic setting. Preliminary studies, however, were inconclusive on why a slide would occur in one place and not in another, and on why a slide would cut deeply into one terrace and shallowly into another. Comprehensive research was begun in 1950 to determine the factors underlying these apparent differences.

Investigations consisted of studies and measurements of more than 300 landslides in the Nespelem silt of Pleistocene age. Slides were classified into type groups, so that each type might be analyzed and compared with the others. The geologic environment was subdivided into the classification factors—material, ground water, terrace height, drainage, original slope, submergence, culture, and material removal. These factors were subdivided into quantitative or qualitative categories that could be determined by field examinations.

Elements of the geometric configuration were measured and analyzed with relation to the classification units in important type groups. For the purpose of this study and its practical significance, the key measurement of a landslide has been conceived as the ratio HC/VC, where HC and VC are, respectively, the horizontal and vertical distances from the foot to the crown of the landslide taken at midsection normal to the slope. Of the eight classification factors analyzed by statistical methods, only material, ground water, original slope, and submergence proved to be significantly related to the HC/VC-ratio. By using the various categories of each of these factors, a formula has been developed for predicting the HC/VC-ratio of landslides, thus providing the geologist with a new method of estimating the amount of land that may be affected by impending landslide action in a geologic setting similar to that of the Columbia River Valley.

The stability of natural slopes is being investigated by combining classifications and measurements of slopes on which slides have not occurred with those on which slides have occurred. The analysis includes the variable factors—material, ground water, terrace height, original slope, and submergence. This technique of geologic classification and statistical analysis may be considered a new tool to assist geologists and engineers in estimating whether natural slopes are relatively stable or unstable.

A report describing this work is in preparation. The next phase of the investigations will test the practical application of the slope stability technique and the formula for prediction of the HC/VC-ratio of landslides.

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On "Audiogenic Seizure and the Adrenal Cortex"

THE interesting paper by W. P. Hurder and A. F. Sanders, "Audiogenic seizure and the adrenal cortex," *Science* 117, 324–326 (1953), is unfortunately marred by a faulty analysis of variance and an unsatisfactory interpretation of that analysis, leading to conclusions which are unjustified and largely erroneous.

By using their published treatment means and standard deviations, a correct analysis of variance can be constructed. It appears in Table 1, in different units and after correction of various errors.

The analysis of variance shows (1) some indication that there is an interaction of all three factors together, (2) a "significant" interaction of test and susceptibility, (3) "highly significant" interaction of