Corresponding saturation indexes, based on a hemoglobin coefficient of 14.6 gm. and a volume coefficient of 41 cc. are:

Wintrobe and Miller (Louisiana)	100	men,	averaging	1.02
Osgood (Oregon)	137	"	"	0.98
Haden (Kansas City)	20	"	"	0.96
Gram and Norgäard (Denmark)	7	"	"	0.91
Bie and Möller (Denmark)	10	"	"	0.89

Total, 231 men, averaging 0.99.

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Influence of Change of Sex on the Intensity of Heredity.

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Of recent years intense interest in the investigation of "sex limited" or "sex linked" inheritance by genetic experimentation has tended to divert attention from some of the phenomena of sex noted by statistical workers many years ago.

Pearson,[1] in studying Francis Galton's data for eye color in human ascendants and descendants, noted that the eye color of the younger generation is more highly correlated with an ascendant or collateral of the same than of the opposite sex, and suggests "that change of sex weakens the intensity of heredity." Lutz[2] determined the correlations between the eye color of the great grandparents and the great grandchildren and concluded that "every change of sex in the line of ancestry sensibly weakens the intensity of inheritance."

While the original data are given in multiple categories both Pearson and Lutz used the classical 4-fold table method of determining correlation, dividing the colors for both generations into 2 alternative classes at about the middle of the series of color categories. Since their work was done, papers on contingency[3] and on equivalent probability correlation[4] methods have appeared. It has, therefore, seemed worth while to recalculate these correlations by

[1] Pearson, *Phil. Trans. Roy. Soc. Lond.*, 1900, A. 195, excv, 79.

[2] Lutz, *Biometrika*, 1903, ii, 237.

[3] Pearson, *Draper's Co. Res. Mem.*, Biom. Ser., 1904, i, 1.

[4] Pearson, K., *Draper's Co. Res. Mem.*, Biom. Ser., 1912, vii, 1.

these 2 methods, and to compare the results with those obtained by Pearson and Lutz with the classical 4-fold method.

The original data were recorded in the categories: 1, Light blue; 2, Blue, dark blue; 3, Grey, blue green; 4, Dark grey, hazel; 5, Light brown; 6, Brown; 7, Dark brown; 8, Very dark brown, black.

In determining the equivalent probability correlation coefficients the same groupings of the original 8 categories were made as were employed by Pearson and Lutz, that is, the series of classes was

TABLE I.

Correlations between eye color of ascendants and descendants in combinations involving various numbers of changes of sex.

Generation Number of Changes of Sex		Number of Cases	Correlation 4-Fold Method r	Average r	Equivalent Probability r_p	Average r_p	Contingency Coefficient C_1	Average C_1
Parental								
No change in sex	F-S	1000	.5503		.5285		.5888	
	M-D	1000	.5096	.5300	.4830	.5058	.4806	.5347
One change in sex	F-D	1000	.4370		.3677		.4842	
	M-S	1000	.4817	.4594	.4572	.4124	.4995	.4918
Grandparental								
No change in sex	GF-F-S	765	.4213		.3935		.5071	
	GM-M-D	739	.3180	.3696	.2825	.3380	.3634	.4352
One change in sex	GF-F-D	681	.3802		.3467		.4505	
	GF-M-D	687	.2969		.2570		.4066	
	GM-F-S	741	.2722		.2363		.3728	
	GM-M-S	756	.2523	.3004	.2130	.2632	.3882	.4045
Two changes in sex	GF-M-S	771	.3717		.3422		.3572	
	GM-F-D	717	.2205	.2961	.1777	.2600	.3712	.3642
Great Grandparental							8x8-fold	6x5-fold
No change in sex		368	.3471		.3569*		.4416	.3968
One change in sex		1113	.2217		.1894		.3716	.2942
Two changes in sex		1129	.1452		.1072		.3472	.2103
Three changes in sex		386	.0375		.0376*		.4370	.2979
Total material		2996	.1824		.1659		.2928	.2271

* Calculated by approximate method because the table for calculation of r_p from log X^2 and ${}_o\sigma_r$ does not extend beyond ${}_o\sigma_r = .08$.

broken into 2 groups at the line between "grey, blue green" and "dark grey, hazel."

In determining the contingency coefficients a certain amount of grouping was necessary to avoid the undue influence of cells of abnormally small frequencies. Pearson noted this source of error in the application of the contingency methods and it has been recently emphasized.[5] For the data given by Pearson the original 8x8-fold grouping has been maintained since N is generally large. For Lutz's data contingency coefficients were obtained from 8x8-fold tables and from tables with a 6-fold classification (classes 1-2, 3, 4, 5-6, 7, 8) for the offspring generation and with a 5-fold classification (classes 1-2, 3, 4, 5-6, 7-8) for the great-grandparental generation. Both sets of coefficients are given.

The results appear on Table I, which gives the individual coefficients as calculated by the 3 methods. In the case of the parental and grandparental generations coefficients are given for the individual combinations of GF = grandfather, F = father, S = son, GM = grandmother, M = mother, D = daughter. In the case of the great-grandparents' correlations the number of cases was not sufficiently large to make possible the calculation of the 16 possible coefficients representing each possible combination of sex. The coefficients for a combination of the data to show the magnitudes of the coefficients for 0, 1, 2 and 3 changes of sex are therefore substituted.

The first point of interest is the excellent agreement of the equivalent probability correlation coefficients with those calculated from the older 4-fold method. They substantiate fully the conclusions drawn by Karl Pearson and F. E. Lutz concerning the influence of change of sex on the coefficients measuring the resemblance of ascendants and descendants with respect to eye color.

The contingency coefficients are in general somewhat larger and somewhat more irregular. The only conspicuous exceptions to the conclusions to be drawn from the coefficients based on 4-fold groupings are those found in the case of 1 to 3 changes of sex in the great-grandparental correlation. Here the data are not merely less abundant but are probably less reliable. Because of the relatively small number of cases, the influence of cells with low frequencies is presumably large. This is evident from the fact that coefficients based on 8x8-fold tables are materially larger than those computed from 6x5-fold tables.

We have no suggestion as to the genetic interpretation of the results. The purpose of this note is merely to call attention again to

[5] Harris and Treloar, *J. Am. Stat. Assn.*, 1927, xxii, 460.

the existence of relationships which seem to have been largely neglected of recent years, and which must be more fully investigated before we can feel that the problem of the inheritance of various human characteristics has been adequately treated.

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Reactions of Subcutaneous Tissue to Sodium Ricinoleate and Other Foreign Substances.

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The purpose of this study was to ascertain whether there is a specific cytological response of subcutaneous tissue to detoxified toxin as compared with the reaction to a pure toxin. For further comparison of the reactions, one of the least toxic colloidal dyes was used.

Adult rabbits were injected subcutaneously with single doses of 1 cc. of 1% trypan blau in distilled water, 1 cc. of 1% sodium ricinoleate in distilled water, 1 cc. of diphtheria toxin in 1/500 dilution, and 1 cc. of diphtheria vaccine, *i. e.*, a combination of sodium ricinoleate and diphtheria toxin as prepared by Dr. W. P. Larson of the University of Minnesota. Subcutaneous tissue spreads were made by the spread method used by Maximow, von Möllendorf and others, and were fixed immediately in Zenker-formol. The stains used were Dominici's Eosin-Orange G and Toluidine Blue, Maximow's Hematoxylin Azure II-Eosin, Heidenhain's Iron Hematoxylin, and Weigert's Iron Hematoxylin. Tissue was taken at 45 minute, 1, 2, 3, and 4 day intervals for direct comparison of the effect of each of the named substances.

Very little difference in the appearance of the site of injection was noted in the 45 minute stage in the majority of cases. There were a few cases in which the area of injection turned greyish white when soap, toxin or vaccine was used, and then gradually became mildly inflamed. Some of the animals chewed at the irritated spot and produced an open sore, but no abscesses were found. When incision was made 45 minutes after injection, the subcutaneous tissue was very soft and gelatinous with a considerable quantity of fluid which probably was due in part to the undiffused irritant. The tissue was of pearly white color except with trypan blau, which had stained everything intensely blue.