Now, in the form in which the theory has been developed by Pearson and Yule, the "total correlation coefficient," showing the combined effect of all the factors upon X_1, is

$$R_{1.234\cdots n}=\sqrt{[1-(1-r^2_{12})(1-r^2_{13.2})(1-r^2_{14.23})\cdots(1-r^2_{1n.234\cdots(n-1)})]} \quad (6)$$

in which

$$r_{12.34\cdots i}=\frac{r_{12.34\cdots(i-1)}-(r_{1i.34\cdots(i-1)})(r_{2i.34\cdots(i-1)})}{\sqrt{1-(r^2_{1i.34\cdots(i-1)})(1-r^2_{2i.34\cdots(i-1)})}} \quad (7)$$

is the net coefficient of correlation between X_1 and X_2 after the effects of X_3, ... X_i have been eliminated. The regression equation (3) becomes

$$x_1=b_{12.34\cdots n}x_2+b_{13.24\cdots n}x_3+\cdots+b_{1n.23\cdots(n-1)}x_n, \quad (8)$$

where

$$b_{12.34\cdots n}=r_{12.34\cdots n}\frac{\sigma_{1.34\cdots n}}{\sigma_{2.34\cdots n}}, \text{ etc.,} \quad (9)$$

$$\sigma_{1.34\cdots n}=\sigma_1\sqrt{(1-r^2_{13})(1-r^2_{14.3})\cdots(1-r^2_{1n.34\cdots(n-1)})}. \quad (10)$$

Walker has shown the identity of his m and Yule's $R_{1.234\cdots n}$; and it is not difficult to show that the numerical values of the coefficients given by (4) and (9) are identical, but are much more easily obtained by the following device due to Walker:

Write (3) in the form

$$\frac{x_1}{\sigma_1}=c_2\frac{x_2}{\sigma_2}+c_3\frac{x_3}{\sigma_3}+\cdots+c_n\frac{x_n}{\sigma} \quad (11)$$

by replacing a_{1i} with $c_i\frac{\sigma_1}{\sigma_i}$; the ratios of the actual departures from the averages to the standard deviations, x_i/σ_i, Walker calls the "proportional departures." Then it may be shown that

$$m^2=c_2^2+c_3^2+c_4^2+\cdots+c_n^2+2c_2c_3r_{23}+2c_2c_4r_{24}+\cdots+2c_3c_4r_{34}+\cdots \quad (12)$$

Furthermore, since

$$x_i=r_{ij}\frac{\sigma_i}{\sigma_j}x_j, \quad (13)$$

we have

$$\begin{aligned} r_{12}&=c_2r_{22}+c_3r_{23}+c_4r_{24}+\cdots+c_nr_{2n},\\ r_{13}&=c_2r_{23}+c_3r_{33}+c_4r_{34}+\cdots c_nr_{3n},\\ &\cdots\cdots\cdots\cdots\\ r_{1n}&=c_2r_{2n}+c_3r_{3n}+c_4r_{4n}+\cdots+c_nr_{nn}, \end{aligned} \quad (14)$$

$(n-1)$ simultaneous linear equations from which the c's may be found, by employing any of the well known shortened methods of solving such a set of equations.[4]

Thus the total correlation coefficient and the regression equation may be found without computing any of the great number of net correlations required by the usual methods.

[4] See E. T. Whittaker and G. Robinson. *The Calculus of Observations*, London, 1924. Chap. V, and *Arts*, 121, 117.

NOTES, ABSTRACTS, AND REVIEWS

FOUR WIRELESS STATIONS TO BE ERECTED IN GREENLAND

(Excerpts from report by J. D. Price, United States minister, Copenhagen, Denmark, March 10, 1924)

The parliamentary committee on finance has now granted an appropriation of about 700,000 crowns [$170,327.00] for the erection of four wireless stations (of the Danish Poulsen system) on Greenland, which Continent will thus be enabled to share directly in world intercourse. The stations are also expected to prove of both direct and indirect value to commerce and science, especially to the international weather service.

The stations, which are to be constructed by the Danish Radio Co. of Danish material supplied by Skoumann & Petersen and other Danish firms, are to be located at Angmagsalik (on the eastern coast), Julianehaab (southern point of Cape Farewell), Godhavn and Godthaab (both on the western coast). The main station is to be at Julianehaab and is to be of sufficient capacity under normal conditions to correspond with the present stations at Reykjavik (Iceland) and Thorshavn (Faeroes), and under especially favorable conditions, to reach the main Danish station at Lyngby (near Copenhagen) and the European Continent.

Three of the stations are to be adapted for telegraphic communication with continuous waves, and to be fitted with spark transmitters for local correspondence.

FRANK HAGAR BIGELOW, 1851-1924

Professor Bigelow was born at Concord, Mass., of sturdy New England antislavery stock. He was graduated from Harvard in the class of 1873, and soon thereafter entered the Episcopal ministry. The development of an affection of the lungs cut short his ministerial career, although he was in close affiliation with the church throughout his whole life. In seeking a dry climate his attention was directed to Argentina where a former Harvard graduate, the late Dr. B. A. Gould, was engaged in astronomical work. Bigelow served as assistant to Doctor Gould, 1873–1876 and again 1881–1883. Returning from South America he was successively professor of mathematics, Racine College, 1884–1889 and assistant in the Nautical Almanac Office, 1889–1891, member of United States Eclipse expeditions, to West Africa, 1889; Newberry, S. C., 1900; Spain, 1905. He was appointed professor of meteorology in the United States Weather Bureau in October, 1891, and resigned in 1910. He spent the next 11 years with the meteorological service of Argentina, being stationed for the most part at Cordoba and Pilar. On his retirement from that service in 1921 he went first to Marseilles, France, and later to London. Finally, he went to Vienna where he died of pneumonia on March 2, 1924. His wife survived him but a few days and succumbed to the same disease

Professor Bigelow was by nature a student-investigator and was possessed of a seemingly inexhaustible supply of energy backed by the will to pursue any subject that he might take up until the end.

Perhaps his outstanding piece of work while with the Weather Bureau was his contribution to the subject of the general circulation of the atmosphere in a series of related papers that were published in the MONTHLY WEATHER REVIEW, 1902–1906. Previous to the writing of these papers he had finished two ponderous volumes, the first on the international cloud observations, and the second on the barometry of the United States. Both