

Professor Bache declared that between his own map and that of Loomis, when proper allowance was made for the secular change, "the agreement was remarkable." This epoch of about 1840 is remarkable for the number of zealous, devoted and unselfish students of terrestrial magnetism.

From 1878-1883, Professor Francis E. Nipher, Professor of Physics at the Washington University of St. Louis, undertook a detailed magnetic survey of Missouri. Professor Nipher must be duly credited with the spirit and enterprise he exhibited in the inauguration of this survey. He was dependent entirely upon private aid for the defraying of the expenses of the work. The instruments were loaned by the Coast and Geodetic Survey. Professor Nipher has published thus far five reports of this work.¹ He has, however, not been able to complete the survey, and so no final report and no maps have been published. He had observed, with the aid of assistants, at 149 stations, or on the average at one station to 438 square miles.

At the same time some preliminary observations appear to have been made by Professor Gustav Hinrichs in Iowa, but the survey does not seem to have progressed far beyond a mere beginning.

We next come to the declination survey carried out—this time under state auspices—under the direction of Professor George H. Cook, then State Geologist of New Jersey, now deceased. The epoch of the survey was 1888-90, all the observations to the extent of 158 stations having been made within a few years of this date. There was thus on the average one declination station to about 52 square miles. The observations were not made with special magnetic instruments, but good surveying transits were used. The observers appear to have executed the work as carefully as the methods and instruments would permit. "During October, 1887, two parties were placed in the field, each supplied with good surveying transits, the needles of which were six inches in length, and had been put in perfect order and carefully compared with each other and with a standard needle. . . . In this way observations were obtained at 121 localities within a period of six weeks." Let us say that each party consisted of two

¹ Transactions of the St. Louis Academy of Sciences, 1878-1886.