

able observational data, largely because of delays caused by the late war, were still not as extensive as they are now. The 1920 results had been distinctly designated as *preliminary* ones, which fact Dr. Sanford has apparently overlooked. However, the results of the computations to date, though differing somewhat in detail from those for 1920, support the general conclusions previously drawn: The non-potential system besides being unsymmetrical about the axis of rotation is also found to be unsymmetrical about the equator, hence we must not expect, as did Dr. Sanford, that the computations of magnetic line-integrals along corresponding parallels of latitude on opposite sides of the equator should give identical results. The combination of results for corresponding parallels, north and south, was made with the view of obtaining approximately the system symmetrical about the equator. The difficulties encountered in finding an adequate physical explanation of non-potential effects are minor as compared with those which arise when attempting to explain the origin of the earth's magnetic field in the manner Dr. Sanford has attempted.

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CAVERNS IN THE GUADALUPE MOUNTAIN RANGE

It is evident from the note on the "Carlsbad Cavern in New Mexico" in *SCIENCE* for December 14, 1923, that Dr. Lee and Mr. Holley are not well acquainted with the early history of that cavern.

The writer met at Carlsbad, New Mexico, in the autumn of 1914, a Mr. Borden, then superintendent for the Los Angeles fertilizer concern then working the guano deposits of the Carlsbad cavern. Mr. Borden described to the writer an exploring trip which he had made in the cave which occupied the time from early one Saturday until the afternoon of the following Monday, the work of exploration being continuous during that interval of time except for the intervals necessary for sleeping and eating.

In the summer of 1918, Dr. N. F. Drake, then state geologist of Arkansas and professor of geology, University of Arkansas, and the writer explored the cavern for a distance of about three fourths of a mile from its main entrance. At that time they were informed that the then superintendent in charge of the guano extraction had succeeded in reaching a distance estimated to be ten miles from the mouth of the cavern, but had not found its end.

There are other notable cavern in this same Guadalupe mountain range. One is found in Slaughter Canyon about two miles from its mouth and was visited by us. In its vicinity there were formerly other great caverns later filled in by travertine de-

posits. At the time of our examination of the region two wells were being drilled on the eastern flanks of the Guadalupe Mountains. One of them encountered a cavern from which a continuous current of cold air issued. The other well was six miles distant from the first. The driller had his hat sucked down the hole when the drill broke into a cavern in this well. Another large cavern was reported to have been found near where the Carlsbad-Queen road crosses the summit of the Guadalupe Mountains.

Other notable caverns occur in the San Andreas limestone of the Sacramento Mountains, the next range north of the Guadalupe. Three days after the summer rains of 1918 began on the summit of the Sacramento Mountains in the vicinity of Cloudercroft wells in the vicinity of Roswell, some 70 miles distant, which previously it had been necessary to pump, began to flow out at the surface. It is likely that the water derived from the rainfall in the mountain summits reached the wells 70 miles away in three days and travelled a considerable part of the distance through underground caverns.

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THE FLASHING OF FIREFLIES

THE articles in *SCIENCE* on "The synchronous flashing of fireflies"¹ might lead one to infer that knowledge of this peculiar phenomenon is a recent contribution to science. I have in my possession a textbook studied by my grandfather. This book, called "An Easy Grammar of Geography," was published in Philadelphia in the year 1810. The author is Reverend J. Goldsmith. May I quote paragraph 187 on Siam?

The elephants of Siam are distinguished for sagacity and beauty. The trees on the banks of the Meinam River are finely illuminated with swarms of fire-flies, which *emit and conceal their light as uniformly as if it proceeded from a machine of the most exact contrivance.*

The italics are mine.

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JOSEPH LEIDY

DR. OSBORN, in his address at the Leidy Centenary (*SCIENCE*, Feb. 22, 1924), referred to Dr. Leidy's breadth of knowledge. This was shown in his ready comments upon the varied papers read before the Academy of Natural Science in Philadelphia. I recall one evening in the early eighties one of the members read an elaborately prepared paper upon the origin of the name of the arbor vitae, taking the accounts of the early Canadian pioneers, and their use of the arbor vitae branches for their beds, and of the

¹ *SCIENCE*, Vol. LIII, p. 485 (1921); LIX, 163 (1924).