form. The question of whether they have relatively recently gained access to the interior of the rock or have always been there remains to be determined by further investigation. Detailed studies with improved technique are now in progress to answer the numerous questions which have arisen as a result of my discovery. Many types of rock will be studied and especially specimens derived from great depths where surface contacts could have played no part in furnishing the results noted. The Pre-Cambrian specimens thus far used were surface samples, but the Pliocene specimen was a deep sample as explained above. The organisms in the Pre-Cambrian rocks and those in the Pliocene rocks are quite different from one another. No algae of any kind, and no nitrifying bacteria have ever been found even in cultures maintained for several months or more.

It need hardly be said that the significance of the facts stated above is extremely great from the physiological standpoint and also from the evolutionary standpoint.

I am indebted for rock specimens to Dr. David White, of the U. S. Geological Survey, and to Dr. G. D. Louderback, of the University of California. I am glad to acknowledge also my obligation for assistance in some of the culture work to Mr. Herbert Copeland, of the Sacramento Junior College.

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NOTE ON THE RADIAL MAGNETIC GRADIENT OF THE SUN

DR. HALE and his collaborators at Mt. Wilson Observatory have studied the general magnetic field of the sun by spectroscopic measurements of the Zeeman effect. These researches established the fact that at any given level the distribution of the magnetic field was very similar to the terrestrial distribution. A study of the radial distribution showed that the field decreased radially several thousand times as fast as would be expected if the sun were uniformly magnetized. This rapid radial variation has made it very difficult to obtain a consistent view of the general magnetic fields of the sun and earth.

In a recent paper[1] the writer pointed out that under certain conditions of ionization, temperature, pressure and magnetic field, a true diamagnetic effect exists which is due to the motion of ions or electrons spiralling about an impressed magnetic field. On the earth the conditions in the Kennelly-Heaviside layer satisfy the requirements and it was shown that the diamagnetic effect of this layer would account for the solar component of the diurnal variation of terrestrial magnetism.

[1] *Physical Review*, Vol. 32, p. 133 (1928).

Such data as are now available from spectroscopic studies indicate quite definitely that conditions on the sun at altitudes corresponding to regions of large radial magnetic gradient are precisely those most favorable for a large diamagnetic effect. Preliminary calculations appear to show that the intensity of magnetization of the diamagnetic layer of the sun is quite ample to account for the observed gradient. Moreover, the type of variation of the diamagnetic effect with the altitude above the surface of the sun is of such a nature that it appears quite possible that the magnetic field at the surface proper is much greater than has been generally accepted. This possibility is theoretically of great importance since it may shed considerable light on the origin of the magnetic field. A quantitative and more detailed study of the effect is now being undertaken.

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THE SO-CALLED SIEVE OF ERATOSTHENES

FEW mathematical developments due to the ancient Greeks are now more widely known or more frequently referred to than the so-called Sieve of Eratosthenes for finding all the prime numbers which do not exceed a given number n. Such references appear sometimes even in the somewhat popular literature as a result of the fact that the use of the method represented by this sieve involves only very elementary mathematical considerations. The method may be illustrated by writing the natural numbers in order of magnitude, beginning with 2 and ending with the arbitrary number n, and then canceling every second number after 2 in the list. After this has been accomplished every third number of those which follow 3 is canceled and then every fifth number of those which follow 5. In general, after the multiples of any number k have been canceled the multiples of the first uncanceled number among those which follow k are canceled. The numbers which remain uncanceled after completing these operations constitute the list of the prime numbers which do not exceed n.

In 1911 E. Hoppe directed attention in his "Mathematik und Astronomie," page 284, to the fact that this method was known to the Greeks long before the time of Eratosthenes, and hence that the common term Sieve of Eratosthenes is actually a misnomer. Before this time all writers who referred to this subject seem to have credited Eratosthenes with the discovery of this method, which is the only one found in the mathematical literature of the ancients for determining all the prime numbers which do not exceed a given number. In fact, nearly all the writers who referred to this subject since 1911 have also given