Professor Langley deduced from his bolometer studies about 3.00 calories; that Angström and others obtained 4.00 calories, and those were common results for some years. Mr. Abbot reduced the value to 1.94 calories, relying solely upon the pyrheliometer, and at the same time recognized that the ordinates of the bolometric spectrum indicate a solar temperature of about 7000° A., the pyrheliometer requiring only 5800° A. He passed over this wide discrepancy by assuming that the sun does not radiate as a black body. This is the critical point. The Poynting equation of equilibrium asserts that the surface flux of radiation over a given volume sustains a certain volume density whose temperature is T. This equation has been applied by me in detail to the earth's atmosphere, so that in ten distinct integrations the volume density from the sea level to the vanishing plane amounts to 3.98 calories; it has been applied in the sun's atmosphere with the result that the solar radiation originates in a deep isothermal layer at the temperature 7655°. It is, therefore, black radiation, of an equivalent value of 5.85 calories; using Abbot's coefficients of transmission for several spectrum lines, from the center to the limb, this is depleted by 1.87 calories, thus agreeing with the terrestrial data and the bolometer. This result destroys Abbot's theory, and renders his pryheliometric method useless.

It is not difficult to understand the source of Mr. Abbot's error. He relies upon the Bouquer Formula of depletion, and, indeed, substitutes this for the Poynting Theorem, which is erroneous. When there is lack of equilibrium between the surface flux and the volume density, there is a product of free heat, $dQ = cdT$, while the temperature is changing. The pyrheliometer works on this change of temperature alone, omits to register the stored potentials and inner energy within the metals, glass, mercury, these last being very difficult to follow. In short, Abbot's theory identifies the surface flux of radiation with this free heat, and it follows that it does not manifest the entire radiation received. For these reasons I have abandoned Abbot's methods and substituted those found in my "Treatise on the Sun's Radiation." It may be noted that the pyrheliometer is a very inefficient apparatus for atmospheric studies, because it is unable to eliminate the depletions due to the effects of vapor, dust and even molecular scattering in the higher levels. Applying certain correcting ordinates, the stations at Cordoba-Pilar, 438 meters, and at La Quiaca, 3465 meters, are working together within 0.02 calories, and they follow the solar variations as indicated by the sun-spots, prominences, magnetic field and the meteorological data in Argentina. It is imperative that Mr. Abbot should abandon his unfortunate pyrheliometer method, which is flatly contradicted by a very extensive series of data, in favor of the results which are clearly indicated by his admirable observations with the bolometer.

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FIREFLIES FLASHING IN UNISON

To the Editor of Science: In Science for July 26, 1918, there appears an article on "Fireflies Flashing in Unison," by Edward S. Morse. Confirming his statement and that of other observers that fireflies do at times synchronize their flashes I beg to relate an instance that occurred on the evening of May 4, 1918, on the Benguet road. At that time I was a passenger on the auto-stage run by the Philippine government between the railroad station at Mangaldan and Baguio. As the stage rounded one of the numerous curves on the grade there appeared on our left, apparently in motion, a ghostly incandescence which came and went in regularly repeated flashes and intervals of darkness. The appearance was uncanny and was plainly visible to all the passengers in the stage. We did not at first realize its cause but soon attributed it to fireflies. As I have said the light was apparently in motion, but I am inclined to believe that the insects which caused it were not in continuous flight but were congregated (as is frequently the case in the Philippines) about some tree standing

below us on the mountain slope and that the apparent motion was caused by the actual motion of the stage. At any rate there can be no doubt that the fireflies were flashing in unison.

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SCIENTIFIC BOOKS

The Passing of the Great Race. By MADISON GRANT. New York, Charles Scribner's Sons. 1918. Pp. 296.

It is rare that an author of a scientific work which is not a text-book has the pleasure of seeing a second edition within two years. Mr. Madison Grant's recent success is sufficiently justified, since he has written both boldly and attractively, and has produced a work of solid merit. Even the title, "The Passing of the Great Race," is of the sort to make a popular appeal, for there always seems to be an eagerness to read of some horrible future in store for mankind. Hence the success of books on degeneracy, race suicide, cessation of intellectual evolution, disgenic influence of war, and the elaborations of obvious pessimism—books and articles usually written by persons blind to the complexity of the problems and to the optimistic significance of facts and arguments on the other side.

Mr. Grant believes in the inborn value of the Nordic race, that tall, fair-haired, long-headed breed which started from the shores of the Baltic some three thousand years ago, formed the ruling classes in Greece, Rome, northern Italy, Spain, northern France, England and parts of the British Isles, and then, in the southern countries, passed away either through its inability to stand the climate in competition with brunette types, or through dilution and pollution of its blood by mixture with inferior peoples.

The present reviewer accepts, in the main, this racial theory of European historical anthropology. This theory rests upon two chief factors. The first is that so well elaborated by Mr. Grant in his book, namely, that it is supported by the facts of history. In other words, if we start with an extreme "hereditarian" hypothesis as to the special value of the Nordic race, we do write a good ethnological and anthropological history of European and Asiatic culture. The broad panoramic changes are systematically and reasonably explained by such an hypothesis. There is no shifting about—something relying on a theory and then having constantly to resort to some involved explanation because the theory has failed to work. In all this Mr. Grant's book is admirable; but it is open to criticism at the hands of opponents. The author rarely if ever discusses disputed points. For instance, he alludes frequently to the fact that in all European literature and art, the heroes, saints and madonnas have always been depicted as blondes, but he ignores the fact that its significance has often been questioned. In this matter, antagonists to the doctrines of heredity and to the native superiority of the blonde race usually say that the blonde type was admired because of its rarity. How is this to be answered? It is an affair of the author, not the reviewer.

In the last pages of his book, Mr. Grant gives a bibliography; but nowhere does he insert a footnote or give a reference to the sources of his information. While this may in some slight degree make the text more readable, it is a great pity that a reader can not more easily trace to their origins or further investigate many of the interesting and novel statements met with in this provocative book.

The second good reason for believing in the importance of inborn native mental differences, and consequently in the truth of most of what Mr. Grant asserts, is that there is a mass of carefully finished statistical research on the problem of human heredity which tends to support the whole theory of race as against environment. If adult human differences within a single family and within a single class are largely the result of pre-formed differences in the chromosomes of the primary germ cells, then there is at least a good hypothesis that the same is true for racial differences.

However, it requires further proof in the case of race, since the children of the same