face rock was exposed with beautiful parallel striation running north and south. The exposure, therefore, had nothing to do with the preglacial outlet, but it gave emphatic evidence that the ice movement was not in the direction of the axis of the lakes but directly across it, and hence could not be a means of eroding the lake basin.

The actual preglacial outlet of Lake Erie, however, emerges from the escarpment about three miles southwest of St. Catharines. This was discovered by Dr. J. W. Spencer and the evidence presented in great detail in his report published by the Canadian Survey in 1907, on "The Evolution of the Falls of Niagara," a volume of 500 pages in which the facts relating to Niagara Falls and the glacial phenomena of the peninsula between the lakes are presented with great fullness and accuracy. I could do little more than follow in Dr. Spencer's footsteps with this book in hand, to test the evidence. The results of Spencer's investigations are very impressive as one goes over the field. At the point mentioned there is an embayment in the escarpment, two miles wide at the level of the Niagara limestone; and lower down at the level of the Clinton limestone or Medina sandstone, the gorge is a mile wide filled with glacial debris which has been penetrated by wells to a considerable distance below the level of Lake Ontario. The glacial filling in the gorge, which originally rose to the surface, has been much eroded by Twelve Mile Creek and its tributaries which penetrate it, giving rise to a region known as the "short hills."

Three or four miles above the mouth of the gorge the line of the outlet is covered by a remarkable deposit of superficial glacial debris known as Font Hill which is something like an immense drumlin or kame and rises at its sumit 300 feet above the level of the Niagara escarpment and extends in a northeast-southwest direction between three and four miles, being at its widest point about a mile wide. The material shows stratification on the sides, such as appears in eskers. This accumulation is unique, and rises up like a mountain peak out of the level plain which extends all the way north to the Lake Erie basin. I will say nothing further about the theory of its origin at present; but will reserve what I have to say upon it for some future occasion when I may consider it in connection with some other unique glacial accumulations of that character in that region, notably, Berrymans Hill, about a mile west of Niagara Falls.

North of Font Hill, as has been said, there extends a level plain to Lake Erie and only fifteen or twenty feet above it. In this plain all preglacial channels are obliterated by the glacial deposits which form the surface; but Dr. Spencer had collected the record of wells all over the region, which show clearly that there is a continuous buried channel, about 200 feet deep, which emerges from Lake Erie just east of Lowbanks, about half way between the mouth of Grand River and the head of the Welland Canal at Port Colborne. There is, therefore, no doubt left that this "Erigan channel," as Dr. Spencer calls it, which emerges from the Niagara escarpment near St. Catharines is the real preglacial outlet to Lake Erie.

Dr. Spencer's investigations concerning the tributaries of this Erigan channel are also of special interest, and it was the facts, revealed by the well borings, concerning these that led to the real discovery. Chippewa River, which enters the Niagara just above the falls, rises twelve or fifteen miles west of the Erigan channel; but before it reaches the Niagara it crosses a buried channel which well borings show slopes from the Niagara River southwestward until it merges into the Erigan channel. Numerous other tributaries are found to do the same. Mr. Spencer's investigations deserve to be more widely disseminated to forestall the publishing of such items as that referred to at the beginning of this communication.

G. FREDERICK WRIGHT

OBERLIN,

RELATIVITY AND ESTIMATES OF STAR DIAMETERS

TO THE EDITOR OF SCIENCE: In reducing the measurements of the diameter of Betelgeuse

made with Michaelson's wonderful apparatus, no allowance appears to have been made for the effect of the gravitational bending of light. Obviously this would make the apparent angular diameter greater than the real, and a rough approximation shows that this gravitational effect may be of the same or an even larger order of magnitude than the observed angle.

Knowing the parallax and being able to make an approximate estimate of the density, the true diameter of Betelgeuse may be determined with fair accuracy. I have made a rough calculation and find that it is approximately only one fifth of the diameter given, but the calculation should be made by others better fitted than I am.

Reginald A. Fessenden

THE CONSERVATION OF GAME AND FUR-BEARING ANIMALS

The New York State Conservation Commission issues *The Conservationist*. Among the many important communications in it, I wish to call especial attention to one, "New York's annual game dividend," written by Warwick S. Carpenter, secretary of the Conservation Commission.

On the basis of precise data the conclusion is reached that the game and fur-bearing animals of New York state, if capitalized, are worth not less than $53,000,000; they return an annual dividend of more than $3,200,000; and they cost the state for their protection and increase the nominal sum of $182,000. This cost of protection and increase is thus less than six per cent. of the annual dividend.

There is need for emphasizing the financial as well as the æsthetic and scientific sides of the conservation problem and these findings of Mr. Carpenter deserve wide publicity.

Henry B. Ward

SCIENTIFIC BOOKS

A Laboratory Manual of Anthropometry. By Harris H. Wilder, Ph.D., Professor of Zoology, Smith College, Northampton, Mass. 200 pp., 43 illus., P. Blakiston's Son and Co., Phila., 1920.

In order that the records of each observer may be readily made use of by every other observer, it is imperative that series of measures be uniform and be taken in uniform ways. The matter of unification was first placed upon an international basis by the International Congress of Anthropologists held at Monaco in 1906. The unification process was carried still further at the Geneva Congress in 1912. There remain for consideration at some future Congress the general skeletal measures, exclusive of the cranium and lower jaw.

The work of the special International Commissions rightly forms the basis of Wilder's Laboratory Manual. However his statement on page vi of the Preface, that the periodicals in which the reports of the labors of the two Commissions "appeared were exclusively European," is incorrect; for a report from the reviewer's pen, of the work accomplished at Geneva, translated from the official copy of Dr. Rivet, chief recorder of the Commission, appeared both in Science[1] and in the *American Anthropologist* for the year 1912.

To the measures accepted by international agreement, the author adds a convenient and useful list of general skeletal measures, as well as angles and indices. No mention is made of the Sphenomaxillary angle, which might well find a place even in an abridged manual. His enumeration of instruments and description of the manner in which they are employed are done with a thorough knowledge of the difficulties which beset the beginner. The pages devoted to simple biometric methods were written for the special benefit of the student, whose chief interest is in morphological relations, and whose mathematical ability and training are not sufficient to enable him to follow abstruse biometric methods.

To the laboratory student of the subject, Wilder's Manual is recommended for its lucidity and conciseness, as well as for the author's ability to transmit a maximum amount of his own pervading enthusiasm for the subject by means of the printed page.

[1] Vol. XXXVI., 603–608, November 1, 1912.