I. Thorold, by Delesse.
II. Napanee Mills, by W. M. Smith, Syracuse, N. Y.
III. Hull, by Delesse.
IV. Quebec, by Delesse.

As to the relative qualities and tensile strength of the various Canadian cements, it has been thought best to say nothing. as "comparisons are odious." Much information and many schedules of testing operations may, however, be found in recent reports of the City Engineers of Toronto and Montreal. In these reports the various Canadian brands are shown in comparison with most of the prominent European and American natural and artificial cements.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Prehistoric Remains in America.

THERE is one fact in regard to the prehistoric and protohistoric remains of North America which does not appear to have received the attention it deserves.

If we examine carefully the descriptions and figures of these remains so far as published and attempt to classify them, we soon find ourselves forced to admit that there are two well-marked, general classes of types, the one belonging to the Pacific and the other to the Atlantic slope. The characteristics which distinguish these two classes are both numerous and well-marked. Geographically, the Rocky-mountain range appears to be the dividing line as far south as the Rio Grande, Mexico, and Central America, belonging to the Pacific slope section.

Although the remains of the Pacific division present many types, varying in the different sections, yet there is such a strong general resemblance, on the one hand, of those found from Southern Alaska south to the Isthmus (excepting a gap in California), and, on the other hand, such a strong contrast with those of the Atlantic slope as to justify the conclusion that this arises from ethnic distinctions and indicates different races. Mr. Swan has long been calling attention to the resemblance between the types of the region inhabited by the Haida Indians and the remains of Mexico and Central America, and no one who will make the comparison will fail to be convinced. Professor Dall, who has studied the manners, customs, and remains of the Northwest Coast, reaches the same conclusion. I cannot enter into details in this brief article, but ask any one who doubts the correctness of this conclusion to compare the figures given by Ensign A. P. Niblack, in his work on "The Coast Indians of South Alaska and Northern British Columbia," with those found on the monuments of Mexico and Central America, and then with the types of the Atlantic slope. It is true that the former are modern, yet the resemblance both in general character and combination to those of Mexico and Central America is too marked to be overlooked, while no such resemblance to those of the Atlantic slope is observable.

Do not these resemblances on the one hand and differences on the other have an important bearing on the question, "From whence did America (or rather North America) derive its original immigrants?" That the works of the two slopes present two distinct classes of types cannot be denied. That there is in California a break in the continuity of the types of the Pacific slope, which seems to indicate an overflow from the Atlantic side, only serves to emphasize the above conclusion. The marked similarity between the types of the Pacific slope and the Pacific Islands has been referred to by Professor Dall (3d Ann. Rep. Bur. Eth., pp. 147–151), who finds that they have prevailed "from Melanesia to Peru and from Mexico to the Arctic." In summing up, he remarks that "the mathematical probability of such an interwoven chain of custom and belief being sporadic and fortuitous is so nearly infinitesimal as to lay the burden of proof upon the upholders of the latter proposition." Professor Dall does not argue from this a common origin of the people possessing these characteristics; but believes they have been "impressed" upon the inhabitants of the western coast from the Pacific side. Notwithstanding this disclaimer, does not the evidence indicate two streams of original immigration, one to the Atlantic and the other to the Pacific coast? Ensign Niblack, although disclaiming any inference to be drawn therefrom as to relationship, gives a list of resemblances between the customs and works of the New Zealanders and Haida Indians that is certainly remarkable.

The idea that America was peopled by way of Behring Straits is somewhat losing its hold on the minds of students, and, as a usual result, there is a tendency to swing to the opposite extreme. Drs. Brinton and Hale are inclined to believe, chiefly from linguistic evidence, that the first settlers came from Europe to the North Atlantic coast. The former says in his "Races and Peoples," pp. 247–248, "Its first settlers probably came from Europe by way of a land connection which once existed over the North Atlantic, and that their long and isolated residence in this continent has moulded them into a singularly homogeneous race, which varies but slightly anywhere on the continent and has maintained its type unimpaired for countless generations. Never at any time before Columbus was it influenced in blood, language, or culture by any other race."

Now it may be that settlers came from Europe to the North Atlantic coast, but the evidence is decidedly against the remainder of the above quoted paragraph, which is, in fact, somewhat self-contradictory. For, if the settlement was at one point, by one race, and this race was never influenced by another, it is difficult to imagine in what respect the moulding process acted. However, the chief objection is to the theory of a single original element, and the assumption that it was never influenced in pre-Columbian times by any other race or element. The facts set forth by Professor Dall and confirmed by Ensign Niblack are too apparent to be set aside by any theory or mere declaration. Even without the evidence presented by these parties, the differences between the archæologic types of the Pacific and Atlantic slope are sufficient to outweigh any argument that has been presented against intrusive elements. CYRUS THOMAS.

Washington, D.C.

Some More Infinitesimal Logic.

PROFESSOR BOWSER, in his reply to me in *Science*, Mar. 10, does not recognize the logic of his calculus in the example in question. The only reasons given in his calculus that would permit the use of $\cos dx = 1$ are, the axiom (?), page 12: —

"An infinitesimal can have no value when added to a finite quantity and must be dropped."

And, page 37: —

"Because the *arc dx* is infinitely small, . . . its *cosine* equals 1."

If, for these reasons, $\cos dx = 1$, then, for the same reasons, $\sqrt{2}\cos\left(\frac{\pi}{4} + dx\right) = 1$.

Four out of the five axioms on page 12 are misleading, not to say incorrect. The orders of infinitesimals or infinites to be retained in an expression do not depend upon the expression, but upon the use that is to be made of it. Sometimes we must use $\cos dx = 1 - \frac{dx^2}{2}$ or $= 1 - \frac{dx^2}{2} + \frac{dx^4}{24}$, etc. Quite prominent mathematicians have failed to do this properly in instances where they would naturally use great care. Reasoning on infinitesimals is at best of a slippery character. I have referred in my former article to an example (Ex. 3, p. 325) where Professor Bowser obtains a result that is easily verified to be incorrect; yet the logic of his work seems correct, not only to the average, but to the best students; and it must have seemed right to Professor Bowser, or he would not have inserted it.

The second proof of the differential of the logarithm, pp. 29–31, is another example of false logic. The same proof is found in Olney, p. 25; Taylor, p. 24; Hardy, p. 31; and is the only proof relied upon by some of these authors. This is quite a list of mathematicians who have indulged in infinitesimal reasoning of the value zero, and who will probably learn of it for the first time through this article. It is easily seen that the logic is false by

the fact that it applies step for step when d is replaced by $\triangle$, the finite difference symbol, giving the result $\triangle \log z = m \frac{\triangle z}{z}$, with m independent of z, which is absurd.

I am not opposed to the method of infinitesimals when properly presented. It is logically only an abbreviation of the method of limits, and I should, for my own satisfaction, always want to test new results obtained by it, with the method of limits in full. I should be glad to see Professor Bowser revise his book. There are some good things in it. I trust Professor Bowser and the other authors mentioned will take my criticisms in the spirit they are intended. We are all liable to make mistakes, and if I should indulge in book-writing to any extent, there would no doubt be some sins of that kind of my own commission, especially in the subject of infinitesimals.

A. S. HATHAWAY.
Rose Polytechnic Institute, Terre Haute, Ind., March 16, 1893.

Color of Flowers.

WILL some of the readers of *Science* tell me what to use for preserving the color of flowers when pressing them?

JEANNE NEAL.
Saint Joseph, Mich.

BOOK-REVIEWS.

Extinct Monsters. By REV. H. N. HUTCHINSON, B.A., F.G.S. New York, D. Appleton & Co.

THIS book is, as the author states, a popular account of some of the larger forms of ancient animal life. It is impossible to say too much in favor of the proper kind of popular science. The only argument that scientific research can advance for itself, is that the results of its work will appeal to mankind in general. Scientific investigators must therefore encourage in every possible way all attempts to render science popular and cherish every successful writer in this line. To write popular scientific works is an extremely difficult matter, and there are few in the world who are capable of it. The scientist who is best familiar with the facts is usually either unable to put his facts in a form to be enjoyed by the general reader, or is afraid of losing caste among his friends by doing so. But there is no scientist who does not hail any popular exposition of scientific truth.

There are two faults into which a writer of popular science is liable to fall. If he is too much of a scientist he becomes too technical, and if he is not enough of a scientist he becomes too discursive and too much inclined to fill his pages with rhetorical flourishes. The present book does not fully avoid either of these two faults. At times the reader is led along through a series of rhetorical exclamation points and feels that the author is endeavoring to amuse rather than instruct; and at other times he finds technical terms used which he certainly cannot understand in their proper significance. The book aims to reach those unacquainted with geology, but assumes a knowledge of the succession of geological ages and considerable familiarity with the different strata of rocks. Probably the book would be more instructive if the author had treated his subjects in a little more systematic way, and had not been quite so desirous of introducing popular names on one page to please his non-scientific readers and scientific names on the next page to satisfy his sense of scientific consistency.

But, in spite of the trifling inperfections, it must be stated that this book is an emphatic success as a bit of popular writing. The style is easy and interesting. When one takes up the book, he is inclined to read page after page and chapter after chapter without any desire to lay the book down. The author has skilfully interspersed striking incidents connected with the discovery of special fossil types in such a way as to add vivacity and life to the whole.

The most valuable and interesting part of the whole to all must be the figures in which the book abounds, drawn by J. Smit. These figures are partly skeletons, and represent our present actual knowledge of the hard parts of the extinct monsters as collected in the museums of the world. But the figures which will most appeal to the reader are the restorations of these ancient monsters in the flesh. Of course, restorations of extinct monsters have been made many times, and they have been constantly changed as new facts are discovered. The author would not pretend that his restorations are final, but it can be claimed fairly, and will be easily admitted, that the restorations, as given in the figures of the present book, are the best that have been made up to the present time, and are certainly nearer the truth in each case than those which have preceded them.

One is very naturally inclined to feel, after a cursory reading of this book, that the ancient world was filled with nothing but monsters, and perhaps the author would have given a better picture of ancient life if he had interspersed with his monsters some of the smaller but no less interesting types of animals. But, on the whole, the book is a success as a bit of popular writing, and can be recommended to all.

Advanced Lessons in Human Physiology. By OLIVER P. JENKINS, Ph.D. 60 cents.

Primary Lessons in Human Physiology. By the same author. 30 cents. Indianapolis, Indiana School Book Co.

THESE two little books are published in the Indiana State series of school text-books, and are designed, one for primary schools and the other for advanced schools. One is glad to see a departure from the plan of teaching simple anatomy and the introduction of a physiological basis of treatment. The physiology of man is studied from the standpoint of general biological truth, and the student may here actually learn something of the laws of life.

Interpretation of Nature. By PROFESSOR NATHANIEL S. SHALER. Boston, Houghton, Mifflin & Co. $1.25.

IT is not very common that a person of as much scientific repute as Professor Shaler of Harvard ventures even indirectly to discuss in print the question of the relations of science to theological problems, and for this reason there is especial interest in the pages of this little book. Professor Shaler, in his preface, tells us that his first contact with natural science had the effect of leading him far away from Christianity, but that of late years further insight into the truths of nature have forced him back again towards the grounds from which he had departed. The body of this publication is a discussion of various problems of natural science for the purpose of pointing out how it is that the discoveries of science fail to be in themselves a satisfactory answer to man's questions as to the philosophy of nature. The different chapters of the book are not and do not pretend to be arguments upon the subject of the relation of theology and science. They are rather thoughts upon certain phases of scientific truth and a general inference as to lack of satisfaction which the mind can find if it rests in scientific truths alone. He discusses the general appreciation of nature historically, and then more in detail the general subject of biological evolution, especially in its philosophical aspect. The general conclusion of the whole is as to the lack of a satisfactory foundation for thought in science itself, and the unavoidable feeling which must come to a thoughtful student of some power unknown and lying deeper than the phenomenon which science studies on the surface. Even in regard to the scientific aspect of the doctrine of Christianity, Professor Shaler tells us that "the doctrine of Christ is the summit and crown of the organic series." One cannot but be forcibly reminded of Spencer's grand generalization that scientific fact and religious thought are both truths, and that the final outcome of study is to be a fundamental union of the two.

This book of Professor Shaler's will be especially interesting to two classes of readers. First to those who have passed through somewhat of this same mental history as that which Professor Shaler points out as his own. This will include a body of scientists who had learned to look deeper than the phenomena and to wonder concerning the underlying truths, a class of thinkers which seems to be a growing one at the present time. A second class is the great body of readers who are and always have been in thorough sympathy with religious teachings, and will rejoice to see a scientist of such high standing taking a position so in harmony with the most advanced religious truth. While, on the