formation thus far received points strongly to that conclusion.

The skeletons of these three whales have been secured for the National Museum, and it is my purpose to publish something more in detail regarding them at a later date.

F. W. TRUE.

U. S. NATIONAL MUSEUM,
December 8, 1904.

THE VASCULAR BUNDLES IN AN APPLE.

IT is probably a matter of little significance or importance as to just how many vascular bundles may be found about the core of an apple or how they are distributed. I have seen quite a number of cuts in books and bulletins, but I have never seen one that was right. Any person can soon decide this matter to his own satisfaction, by cutting transverse sections of several varieties of apples and allowing them to begin drying for a few days, when the bundles may be seen sticking out prominently.

W. J. BEAL.

A GEOGRAPHIC DICTIONARY.

IN SCIENCE, November 11, 1904, p. 649, Mr. Cleveland Abbe, Jr., states that he is compiling a dictionary of topographic terms. It may, therefore, be well to draw the attention of him and your other readers to a 'Glossary of geographical and topographical terms and of words of frequent occurrence in the composition of such terms and of place-names, by Alexander Knox, B.A., F.R.G.S., * * * London: Edward Stanford, 12, 13 and 14 Long Acre, W. C., 1904,' price 12*s* 6*d* ($3), being a supplementary volume to 'Stanford's Compendium of Geography and Travel.' This work appears richer in ordinary geographic terms and components of place-names than in technical physiographic terms, and no references are given to literature.

F. A. BATHER.

SPECIAL ARTICLES.

ASTER FORMATION IN ENUCLEATED EGG-FRAGMENTS OF CEREBRATULUS.*

MANY cytologists have accepted the view that the centriole (or centrosome) is a permanent and autonomous organ of the cell, but the direct proof or disproof of this hypothesis is very difficult, owing to the extreme minuteness of the centriole. The attempt to obtain decisive experimental evidence was first made (1901) by E. B. Wilson by shaking unfertilized eggs to pieces and subjecting the fragments to a salt solution. Asters capable of division, containing centrioles, appeared in a large number of the egg-fragments, including both those with and those without a nucleus. It is evidently highly improbable that all these centrioles can be considered as the offspring of preexisting ones, since it is an essential part of the centrosome hypothesis that the organ is primarily single, save when precociously divided into two. Wilson, therefore, came to the conclusion that some, at least, of the centrioles that appeared in such fragments must have been formed *de novo*. This conclusion has since been accepted by some writers, but attacked by others, partly on critical grounds, partly as a result of subsequent experiments in the same direction. A source of error in the experiment undoubtedly existed in the shaking of the eggs to pieces at random. Professor Wilson, therefore, suggested to me nearly two years ago to perform the crucial experiments of cutting the living eggs into two singly and treating the fragments individually. For this purpose the egg of *Cerebratulus* is particularly favorable, since before fertilization the first maturation mitotic figure lies at one pole, where it is seen very definitely in the living object as a clear space. By cutting off this part of the egg, one may be certain that the remaining portion contains no centrioles and, if centrioles appear in this portion of the egg, they must have been formed *de novo*.

I tried this experiment during the summers of 1903 and 1904, with results which are, I believe, decisive. The mode of operation was as follows: all the instruments and the female worm, from which the eggs were taken, were first thoroughly sterilized with fresh water so

* Abstract of a paper read before the meeting of the National Academy of Science, November 15, 1904. In this communication the term 'centriole' is used as equivalent to 'centrosome' in the original sense, *i. e.*, as the dividing and frequently persistent body at the center of the aster.