That the mathematics of mechanics is at present inadequate to solve all the problems offered is simply because, as Whewell pointed out, the procedures of mathematicians do not yet furnish the necessary apparatus. But to say (as on p. 225) that 'the mechanical conception of heat has not been confirmed;' in the face of the latest treatises on thermo-dynamics, based throughout on the laws of motion, is an inexplicable assertion.

The 'way out' of scientific materialism is not by the assumption of an entity apart from attributes; but by the indisputable truth that the laws of mechanics and motion themselves are in final analysis nothing else but laws of thought, of the reasoning mind, and derive their first and only warrant from the higher reality of that mind itself. D. G. BRINTON.

THE RÖNTGEN RAYS.

PROF. RÖNTGEN concludes his paper *On a New Kind of Rays* by showing that they behave quite differently from the visible, the infra-red and the hitherto known ultra-violet rays, and by suggesting that they should be ascribed to longitudinal waves in the ether. He does not, however, indicate how longitudinal waves would account for the phenomena, and probably most readers of his paper have not seen any evident connection between longitudinal vibrations and the behavior of the Röntgen rays. Prof. R. S. Woodward has, however, called the writer's attention to a fact which Prof. Röntgen does not mention, but which may have been present in his mind. If there be longitudinal waves in the ether they must travel with much greater velocity than the transverse waves. Would not this greater velocity account for the absence (partial or complete) of reflection and refraction, and for the penetration—even the fact that this tends to be inversely proportional to the density of the substance? J. McK. C.

CYCLONES AND ANTI-CYCLONES.

TO THE EDITOR OF SCIENCE: In connection with the diagrams published by Prof. Davis in a recent issue of SCIENCE (N. S. Vol. III., p. 197), showing the circulation of the wind and cirrus clouds in cyclones and anti-cyclones, it seems to me a few words should be added in regard to the method by which the results were obtained. Åkerblom, following Hildebrandsson, found the mean directions of the wind and clouds for different directions and intensities of the barometric gradient as observed at the earth's surface and then drawing concentric circles plotted the results around a central area. This method is not the same as finding the relation of the wind and cloud movements to the centers of cyclones and anti-cyclones. A given gradient is sometimes very near the center of a cyclone or anti-cyclone, at other times far removed from it, and again there may be no well-defined cyclone or anti-cyclone, but merely what are called straight isobar gradients.

At Blue Hill I have found considerable differences between the directions and velocities of the upper currents near to and at a distance from the centers of cyclonic and anti-cyclonic action, and it leads me to the conclusion that mixing together observations made at the two points can only lead to confusing results.

The results of Åkerblom for central Germany by no means agree with the results of Dr. Vettin for Berlin as regards the movements of the cirrus in anti-cyclones. Dr. Vettin found the average movements of the cirrus in relation to the direction of the center of the anti-cyclone, and his results agree remarkably well with those found at Blue Hill. (Amer. Meteor. Jour., Vol. X, p. 172.)

H. HELM CLAYTON.

BLUE HILL MET. OBSERVATORY, Feb. 10, 1896.

SCIENTIFIC LITERATURE.

A Handbook to the British Mammalia. By R. LYDEKKER. Allen's Naturalists' Library, edited by R. Bowdler Sharpe. 8°, pp. 339, col. pls. and text figs. London, 1895. 6 shillings.

From early times the British Mammalia have received a large share of attention. Beginning with Thomas Pennant's British Quadrupeds, in 1786, we have: Memoirs of British Quadrupeds (including a Synopsis), by the Rev. W. Bingley (1809); Natural History of British Quadrupeds, by Edward Donovan (1810–1820); Recreations in Natural History, or Popular Sketches of British Quadrupeds, by W. Clarke

(1815-1819); a History of British Quadrupeds, by Thomas Bell (1837); British Quadrupeds, by W. Macgillivray (Jardine's Naturalist's Library, 1838); a new and revised edition of Bell's British Quadrupeds (1874); British Animals extinct within Historic Times, by James E. Harting (1880); and now, A Handbook to the British Mammalia, by R. Lydekker (1895). The present work differs in scope from any of its predecessors inasmuch as it treats of both the living and the extinct species.

The author states in his preface that he makes no claim to personal knowledge of the habits of British mammals, but has drawn largely on Macgillivray's 'Manual,' of which work the present 'may be regarded almost as a new edition.' The principal differences are that Mr. Lydekker has rewritten the whole of the technical matter, has brought the geographic distribution and nomenclature down to date, from his standpoint, and has added a dozen pages of introduction. In the matter of nomenclature the earliest specific name is adopted when it does not happen to be the same as that of the genus in which it is included. On this point American naturalists will be pleased to read the following, from the prefatory note by the able editor of Allen's Naturalist's Library, Mr. R. Bowdler Sharpe. Mr. Sharpe says "I feel convinced, however, that the absolute justice of retaining every specific name given by Linnæus will some day be recognized. Thus, in my opinion, the correct title of the Badger should be *Meles meles* (L.); of the otter, *Lutra lutra* (L.); of the Roe-deer, *Capreolus capreolus* (L.); of the Common Porpoise, *Phocæna phocæna* (L.); of the Killer, *Orca orca* (L.)."

The illustrations are the same as those in the original edition of Macgillivray, which formed the 22d volume of Jardine's Naturalist's Library (1838). They are cheaply printed, without attempt at fidelity of coloring, and differ from the originals in having the foregrounds, as well as the animals, colored. The original skull outlines also are retained, though for what purpose one can hardly imagine, since in most cases it would be difficult, if they were not so carefully labeled, to tell the family to which they belong.

The feature of the British Mammal fauna that strikes the naturalist with greatest surprise is its paucity in species. In his introduction Mr. Lydekker says that, excluding introduced species, only 41 terrestrial mammals 'can be regarded as indigenous inhabitants of Britain during the historic period,' and five or six of these are now extinct; hence the total number of indigenous mammals now living in England, Scotland, and Ireland together is not more than 35 or 36, and the number inhabiting Ireland is only 19. The contrast with any equal area on the continent of Europe or America is striking. For instance, the single State of New York contains at least 53 indigenous land mammals. The explanation of the small number of species in the British Islands is that the early fauna was largely exterminated during the glacial epoch, and the species have not been able to reach the Islands since. This explanation is rendered the more probable by the fact that a dozen of the present mammalian inhabitants are bats—animals that could easily cross the channel—thus reducing the number of truly terrestrial species to a couple of dozen.

The most extraordinary statement I have observed in the book is that the common shrew spends the cold months 'in a state of profound torpor' (p. 78). So far as known, none of the shrews hibernate; on the contrary, they remain active throughout the longest and coldest winters, and even in the far north scamper about on the snow when the temperature is many degrees below zero.

The book as a whole, while lacking the multitude of detailed observations so valuable to the local field worker, is nevertheless a welcome addition to mammal literature and will prove a useful work of reference for many years to come. The closing chapter on 'The Ancient Mammals of Britain' is the most important of all.

C. H. M.

The Cambridge Natural History, Vol. V., Peripatus. By Adam Sedgwick, M. A., F. R. S., Fellow and Lecturer of Trinity College, Cambridge. *Myriapods*, by F. G. Sinclair, M. A., Trinity College, Cambridge. *Insects, Part I.*, by David Sharp, M. A. (Cantab.), M. B.