characteristic fossils, the leading zonal forms—*Olenellus*, *Paradoxides*, *Olenus* and *Dictyonema*—being the only fossils noted from the Cambrian system. In dealing with Ordovician and Silurian strata the graptolite zones receive particular attention, and other zonal fossils are mentioned. The full stratigraphical details relating to these systems make one feel that scant justice is done to the Devonian; but as a matter of fact our knowledge of that system is far less precise. Here, as occasionally elsewhere, a column for Continental divisions is given. In the Lower Carboniferous, Mr. Hobson starts with the Devon succession and places the Lower Culm Measures with the Coddon Hill Beds on the horizon of the Lower Limestone Shales, whereas their characteristic *Posidonomya* and *Goniatites* indicate an horizon equivalent to the Upper Carboniferous Limestone or Yoredale Series. He has not, however, ventured to indicate zones in the Carboniferous, although materials have been gathered in the neighbourhood of Bristol as well as in northern counties, to which reference is made in the preface. Here and there we would suggest a greater uniformity in method: for instance, the Ammonite zones of the Lias are noted under the names *Ægoceras*, &c.; those of the Inferior Oolite are noted as *Parkinsoni* zone, &c.; and those of the Cretaceous rocks as *Ammonites lautus*, &c. The most difficult correlation is, doubtless, that of the Pleistocene, and here the student may well pause, for the "Upper Boulder Clay" of different areas is not to be regarded as contemporaneous. Indeed, the compiler in his preface remarks that "strata named on corresponding horizontal lines cannot, in some cases, be considered to be of corresponding age"; and the student will do well to bear this in mind.

The work is issued as one of the museum handbooks of the Manchester Museum, Owens College. It cannot fail to be of great service for reference to geologists in general. It bears evidence of the most painstaking care and of wide research up to the date of publication; and we feel confident that the labour will be appreciated.

Die Partiellen Differential-gleichungen der mathematischen Physik. By Heinrich Weber, based on Riemann's lectures. Vol. ii. Pp. 527. (Brunswick: Fried. Vieweg and Son, 1901.)

IN reviewing the first volume of this book (NATURE, vol. lxiii. p. 390) it was pointed out that owing to the great advances in mathematical physics which have taken place in the forty years since Riemann's time, Prof. Weber had found it necessary, instead of merely issuing a revised edition of the well-known "Partielle Differentialgleichungen," to write practically an entirely new book. The present volume, which is written much on the same general lines as the first, is divided into five parts. The first contains the more important properties of hypergeometric series and their application to the theory of linear differential equations. The second part, dealing with conduction of heat, is much after the lines of Riemann's original treatment, and treats mainly of conduction in one dimension and conduction in a sphere. The third part is devoted to theory of elasticity and vibrations, the torsion problem being included in the former subject, and vibrations of strings and membranes in the latter. Electrical oscillations come next in order, and the last part consists of hydrodynamics and propagation of plane and spherical sound-waves, including Riemann's own theory of sound-waves of finite amplitude.

Seeing that a whole volume might be written on any one of these branches of mathematical physics and still leave many interesting points untouched, the treatment in the present book is necessarily but fragmentary in character, but Prof. Weber is to be congratulated on the number of points which he has been able to touch in the limited space of about 500 pages. At the end is an index to both volumes. G. H. B.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

The Total Solar Eclipse of September 9, 1904.

As inquiries have already been addressed to me as to the practicability of observing this eclipse, which passes across the Pacific Ocean (see "Nautical Almanac," 1904, pp. 487–490), perhaps I may be allowed, thus early, to communicate, through your instrumentality, the information I have collected on the subject.

The Walker Islands, which appear on some maps of the locality in the position 149° W., 4° N., would have been, if they existed, very favourably situated for the observation of the eclipse. But recent surveys have shown conclusively that they do not exist.

Kingman, or Caldew, Reef, 162° W., 6° N., is also favourably situated, but is stated in the Admiralty Sailing Directions to be partially dry at low water only.

Palmyra Island is placed by the most recent survey in the position 162° 6′ W., 5° 52′ N., and is thus a little too far south to be available. Proceeding westwards, the next group of islands encountered is the Marshall Islands. But even the most easterly of the group on the track of the eclipse—Aur—is too far west for our purpose, as the middle of the eclipse occurs there shortly after sunrise.

It appears that there is no island conveniently placed for the observation of this eclipse, and astronomers must wait for the total eclipse of the following August, which will afford ample opportunity for observation in Canada, Spain and North Africa.

A. M. W. DOWNING.

The Dilution of Acetylene for Heating Purposes.

YOU have been good enough on one or two previous occasions to give me a few lines in your columns on questions connected with acetylene for heating, and as this use of the gas is extending and will undoubtedly have a much wider extension in the near future, perhaps you will renew your courtesy in this matter.

In country places for domestic and laboratory purposes, more especially with the advance of electricity and decline of coal gas for lighting, the field for acetylene for heating is very large and has so far met with strangely little consideration. The combustion of a gas containing 92 per cent. of carbon successfully in a Bunsen burner is not more easy than its combustion to produce a trustworthy luminous flame. The chief difficulty from which we suffer in the former matter is the relatively high pressure under which the gas must be burnt. No one has yet devised a Bunsen burner which will give a flame large enough for ordinary working purposes under a pressure of less than six inches of water, and even then luminosity is not entirely banished, practically no margin being left for incorrect adjustment of the burner. The pressure is objectionable, it puts the gas fittings to a severe test in the matter of leakage, it is much more than is required for lighting and has to be specially arranged for in many generators, and in those of the automatic class it involves more "after gas," necessitating larger storage capacity. The fine orifice of the jet and the necessarily narrow tube with its accompanying increased internal friction and the large injecting power essential, all make high pressure a necessity. That this luminosity trouble is partly a matter of temperature can be easily shown by heating the tube of a non-luminous Bunsen, or pouring water on to the tube of one showing luminosity, the effect being very striking, and some improvements on these lines have suggested themselves and are efficient as far as they go. We want, however, to attack the root of the matter and dilute our acetylene to begin with, and this dilution would not be altogether objectionable from a lighting point of view. Lighting burners at present generally inject some air and can only themselves be regarded as on the verge of respectability; quite an absurdly small amount of benzene vapour is sufficient to put out of temper the lighting burners now on the market. Such dilution would give them the margin for bad usage which makes so much for success in practice, even though wasteful in theory.