He then proceeds to compare the calculated resistance of certain simple beams with the observed resistance as ascertained by experiment, and he finds that there is a large discrepancy between the calculated and the experimental ultimate resistances. Adopting Mr. Barlow's notation, he calls f the ultimate resistance to direct tension, F the "apparent" resistance to the same force excited by transverse strain, and ϕ the "resistance due to flexure," then $F = f + \phi$. This will be better understood by reference to figures. Mr. Hodgkinson found in the experiment under consideration, that a square inch of cast iron was ruptured under direct tension by 18,750lb., which in the above equation would be the value of f. When, however, a rectangular bar of the *same* material, one inch square, was tested, a weight of 527lb. applied at the centre of a span of sixty inches, just broke the bar. Applying now the formulæ for rectangular beams to this result, the author finds that the ultimate tensile strength of the sample under consideration must be assumed at 45,630lb. in order that the bar may be able to offer the resistance shown in the experiment; the figure 45,630 he calls the "apparent" tensile strength, and would be the value of F in the above equation; accordingly, $45,630 = 18,750 + \phi$, or $\phi = 26,880$lb., this value of ϕ being termed "resistance due to flexure," a term, we are informed, invented by Mr. W. H. Barlow; * and this new resistance being described as "lateral adhesion of the fibres;" and the author informs us, that the neglect of it may result in an error up to 190 per cent.

We have here a fine confusion of everything referring to the subject. An error is made, which to explain away, a new one must be committed; forces hitherto not suspected by mathematicians are discovered by those whose sound judgment was not checked in its growth by the infinitesimal calculus.

Does the author not know the condition which determines the position of the neutral axis of a beam? The neutral axis passes through the centre of gravity of the sectional area of a beam, provided *the resistance of the material to tension and to compression be alike*. In almost every material these resistances differ from one another, but when only a small fraction of the ultimate resistance of the material need be taken into account—say one fourth—then for practical purposes they may be assumed to be alike.

The author proceeds, however, to breaking strain, using cast iron; its ultimate resistance to tension is about eight tons per square inch, to compression about forty tons. Under these circumstances his original formula no longer holds good; the neutral axis no longer passes through the centre of gravity of the section of the beam, it approaches more and more the side where the greater resistance is offered; and were the resistance to compression infinitely great, the neutral axis would coincide with the position of the extreme fibre of the beam on the compression side, and the whole sectional area would be resisting tension only, and the extreme fibre balanced by compression. The beam would then have just double the resistance without assuming the least increase of tensional resistance of the material. The author's ϕ expresses, therefore, the amount of error into which he and others have fallen, and in case it should be zero, they will find $F = f$ as it should be, and the elaborate fabric of confusion disappears.

In other respects, the work contains much valuable information, and if the unfortunate mistake above referred to, did not crop up throughout the 300 pages, and a natural flow of clear language were substituted for a rather dogmatic and vague style, we should be glad to recommend it to the profession, which ought to have all the aid that modern science can afford. * * * * *

* Mr. Barlow, F.R.S., recently read a paper before the Royal Society on this subject, reviving his theory on the resistance of beams to transverse strain.

Meteorology. By Sir John F. W. Herschel, Bart. From the Encyclopædia Britannica. Second Edition. (Edinburgh: A. & C. Black.)

Introductory Text-book of Physical Geography. By D. Page. Fourth Edition. (Edinburgh: W. Blackwood & Sons.)

WE class these two books together as new editions of standard treatises in their respective departments of science that are among the best that can be used by students or teachers. The term "Meteorology," which has entirely lost its etymological meaning, is defined by Sir John Herschel as "the description and explanation of those phenomena which group themselves under the head of the weather, of the seasons, and of the climate," a branch of natural science of the laws regulating which we are at present almost entirely ignorant, as Dr. Balfour Stewart has shown in these pages. Writers on physical geography content themselves at present with a description of the physical contour of the globe, with some slight reference to its climatology, and the distribution of its animal and vegetable life, Mrs. Somerville's handbook being, as far as we know, the most complete in this respect. The better and more logical mode would seem to us to be, first of all to treat of the earth as a member of the solar system, and thence to deduce the laws which govern its natural phenomena; we believe that in this way such phenomena as those of ocean currents and trade winds, and the variations of climate, would be rendered far more quickly intelligible to the learner than is now the case. From his stand-point, Dr. Page's "Introductory Text-book" discusses the subject in his usual clear, concise, and systematic manner.

Rustic Adornments for Homes of Taste. By Shirley Hibberd. New Edition. (London: Groombridge & Sons.)

THAT two editions of this book have been disposed of in a short time is ample justification for the publication of a third, especially when got up in so handsome a style as the one before us. Works of this kind appeal to a large public, not over-critical as to scientific accuracy, but glad to possess that amount of knowledge which enables them to talk about ferneries and aquaria without committing any egregious blunder. We are far from depreciating the value of this smattering of science where it is all that opportunity permits to be attained. Those who like their homes to be surrounded by beautiful natural objects will here find a large fund of information respecting the aquarium, the fernery, the aviary, the apiary, the conservatory, &c., given in a pleasant style, illustrated with woodcuts and coloured plates. The volume makes altogether a very pretty gift-book, especially for a young lady.

E. Millon, sa Vie, ses Travaux de Chimie, et ses Etudes économiques et agricoles sur l'Algérie. Pp. 327. (London: Williams and Norgate, 1870.)

M. REISET, in the preface, tells us that after the death of Millon, his friends and pupils undertook the publication of a collection of abstracts of the numerous works of this illustrious chemist. The book commences with an interesting biographical notice of Millon, by Dr. Hœfer, in which the political questions which led to his long residence in Algeria are as slightly noticed as possible. The principal portion of the volume was arranged by M. Jules Lefort, with the assistance of MM. Coulier, Commaille, and the late Professor Nicklès. The book contains two hitherto unpublished papers, each extending over forty-three pages, one "on Fermentation" and the other "on the Economic and Agricultural problem of Algeria." The researches on corn also occupy considerable space. The other investigations of Millon are arranged in a very interesting manner, frequently in connected treatises. Opposite the title-page is a good photograph of a bust by M. Clément, and at the end of the book is a chronological list of the scientific works of the author, amounting in number to no less than seventy-nine.