that, with a few exceptions, where the precipitated barium sulphate is used as a basis or bearer of certain colouring matters, the admixture of ground native barytes has no other object than that of adulteration. As an oil paint it is absolutely worthless. But while we have not a good word to say for ground native barytes, especially when it enters into the composition of oil colours, it is quite otherwise with the precipitated or artificial barium sulphate, which, in our opinion, receives here too scanty a treatment, judging by the little the author says about its preparation. It seems almost as if he had quite overlooked its vast importance. He omits to mention that this pigment is principally made from native barium carbonate, or Witherite, by what apparently is a very simple process; a process, however, which only in the hands of very few makers furnishes it in that perfect condition in which it finds so large an application in preparing the surface of paper for chromo-lithography. It is not, indeed, too much to say that this art largely owes its modern development to the introduction and use of this form of barium sulphate. Passing on to gypsum, we think, from the description given, the reader will receive quite an exaggerated idea of the qualities and importance of this substance in its application as a pigment. The author says "its body is not as good as that of white-lead, but it is at least equal to barytes in this respect, and is superior to zincwhite." He also states that it mixes well with either water or oil, and it can be mixed with all other pigments without affecting them. Here we might ask, are these the results of the author's own trials? In speaking of its being used very largely by paper-stainers and makers of paper-hangings, he says it is preferred to barytes on account of its having more body when used for that class of work; "bulk," perhaps, would be a more correct term in this case. We almost suspect that the author, whilst speaking of the use of gypsum as a pigment, really means "satin-white," a substance of some importance to the paperstainer and maker of paper-hangings, which is obtained by precipitating aluminium sulphate with caustic lime, and which is a mixture of calcium sulphate and alumina hydrate. This substance, however, we do not find mentioned in the book before us.

It deserves to be noticed that, according to the author, gypsum as well as barytes and China clay are used in the finishing of cotton goods. We were under the impression that this nefarious and stupid practice had been given up before now. Strontium sulphate, under the name of strontian white, finds also a place amongst the white pigments, and considering the price of strontium minerals, we are not a little surprised to see it stated that strontium sulphate is often sent out as a substitute for barytes. Concluding with the white pigments, we find a very full and interesting account of China clay, and the mode of obtaining it from the natural deposits.

Regarding the article on Vermilion, it appears to us that the author is under an entire misapprehension as to the merits of the dry and wet methods of its preparation. It is incorrect to say that the Chinese product is finer and more brilliant in tone than that made in Europe. The vermilion made at present in Europe by the sublimation process is quite equal to, if not better than, the Chinese; but, as regards colour and fineness, the wet-process ver-

million is far superior to either, and is superseding the former.

We should have thought it hardly worth while to mention that the chromates of mercury and silver had been proposed as red pigments, and still less the chromate of copper, which, according to the author, is a dark red (?) coloured body. Under chrome-green we notice that the author takes "Guignet's green" to be chromic oxide, whilst it really is a hydrate of chromium oxide, and the chemical formula he gives for its formation is, of course, quite wrong.

In the article on Ultramarine we notice misspellings of the names of authors, and R. Hoffmann, for instance, is throughout referred to as "Hofmann."

The foregoing remarks have already taken up so much space, that we cannot find room for our comments on the remaining chapters dealing with the colours, and we must conclude here, but not without calling attention to the latter part of the book, which treats of paint vehicles, oils, resins and varnishes, and gives a very full and interesting account of these materials. The description of the manufacture of oil varnishes is particularly valuable, as it gives an exact account of processes which are usually guarded with much secrecy.

BRITISH FUNGUS FLORA.

British Fungus Flora; a Classified Text-book of Mycology.

By George Massee. Vols II. and III. (London: Geo. Bell and Sons, 1893.)

IT was originally estimated that this work would be completed in three volumes, but, as we pointed out in our first notice, this was practically impossible. A notice now accompanies the third volume, to the effect that a supplementary volume will speedily be published in conclusion of the work. The second volume continues the Hymenomycetes, which occupy 268 pages also of the third volume, so that two and a half volumes are occupied by the Hymenomycetes, leaving 220 pages for the Hyphomycetes, which bring the third volume to a close. It is only necessary to enumerate the remaining orders to appreciate the difficulty of completing even with a fourth volume. There are all the Ascomycetes, which occupied in Cooke's "Handbook" an equal number of pages to the Hymenomycetes; and supposing the increase to have been in the same ratio, it may be conjectured that this order (including the Discomycetes) cannot be compressed into less than two volumes. For all that remains afterwards, there will not be so much necessity. There would be the *Sphaeropsidæ* and *Melanconiceæ*, which are of minor interest, although numbering perhaps 700 species. The *Phycomycetæ*, which have recently been the subject of a volume, by the same author, as "British Fungi, Phycomycetes, and Ustilagineæ." Hence they may be dispensed with. The *Uredineæ*, which, with the *Ustilagineæ*, formed a volume by C. B. Plowright in 1889, have had so few accessions that a revision is not imperative. The *Myxomycetes*, which occupied a monograph by G. Massee in 1892, is all-sufficient. As to the *Saccharomycetes* and the *Schizomycetes*, the little volume by W. B. Grove, dated 1884, would furnish an introduction, and would be fairly

complete to that date, in genera and species. With these modifications, we see no reason why, with two supplementary volumes to contain all the *Ascomycetes*, the five volumes might not be accepted as a fair approximation to a "British Fungus Flora."

As far as the *Basidiomycetes* are concerned, and these will occupy half the bulk of the volumes, even if extended to five, it will be conceded that they are of the greatest interest to the largest number of persons, and, moreover, that they are treated with all the fulness that such an important section demands. We cannot help regretting, however, whenever we are called upon to use the book, that the sequence of families and genera were inverted. The ample descriptions, under each species, will nevertheless atone for much, and justify the appropriation of half the volumes to their service.

The 220 pages which are devoted to the *Hyphomycetes* (or moulds), will be especially welcome to students of microscopical fungi, not only because they are arranged according to the most recent system—that proposed by Saccardo—but also on account of the very useful figures illustrative of the several genera. In our opinion, these are the most successful of the illustrations yet included in the present work. It would have been a great achievement, had it been possible, so to have increased the number of these little outline figures, as to have included every one of the species included in the Flora. As to substantial accuracy, that must, to a large extent, be accepted on trust, since the practical use can be the only test of the merits of the text-book, and its demerits—if any.

We can now estimate the number of British species, and see how they are provided for in this Flora, or may hereafter be included, viz. :—

Gastromycetes	...	...	78	...	Vol. I.
Hymenomycetes	...	...	1950	...	Vols. I. II. III.
Hyphomycetes	...	...	635	...	Vol. III.
			—	2663	
Pyrenomycetes	...	...	900		
Discomycetes	...	...	610		
Hysteriacei	...	...	30		
Tuberaceæ	...	...	30		
			—	1570	
Sphærospideæ, &c.	...	...	700		
Uredineæ and Ustilagineæ	...	...	257		
Phycomycetes	...	...	100		
Myxomycetes	...	...	100		
Saccharomycetes and Schizomycetes	...	...	133		
			—	1290	
Total	...	...	5523		

The above estimates of the *Ascomycetes*, at 1570, are only approximate, and probably below, rather than above, the actual number. Hence therefore the total contents of the four or five volumes, as the case may be, would not be less than 4200 species, and the absolute total of all British recorded Fungi upwards of 5500 species, as compared with the 2809 of Cooke's "Hand-book" in 1871, or a duplication in twenty-two years. This fact is a sufficient justification for the publication of the present work.

We need not repeat our general commendation, as expressed in our first notice, except perhaps to intimate that in all respects the second and third volumes are up to the level of the first, and justify the confidence reposed

by the publishers, and ourselves, in the author to whom such an important work has been entrusted. It would be folly to pretend that it is absolutely perfect, but the errors of judgment, or execution, are not such as to detract from the general utility of the most pretentious and important work which Mr. Massee has yet attempted.

M. C. COOKE.

OUR BOOK SHELF.

Some Salient Points in the Science of the Earth. By Sir J. William Dawson, F.R.S. Pp. 499, with 46 illustrations. 8vo. (London: Hodder and Stoughton.)

THIS volume will have a melancholy interest, especially for the older geologists; for the author says that it "is intended as a closing deliverance on some of the more important questions of geology, on the part of a veteran worker, conversant in his younger days with those giants of the last generation, who, in the heroic age of geological science, piled up the mountains on which it is now the privilege of their successors to stand." We must bear in mind this implied limitation, that the heroic age of geology is now past, and must treat the volume before us as containing an account of researches and speculations made during the lifetime of a bygone generation. It is, in fact, a sort of scientific autobiography, touched up here and there to agree with recent research, but not claiming authority as an epitome of the present state of our knowledge.

Few chapters in the history of geology are so fascinating as Lyell's account of the discovery, by Principal Dawson and himself, of the wonderful series of remains from the coal field of Nova Scotia. It reads like the story of the exploration of a new country. We seem to walk among the strange vegetation of the coal; we see the larger reptiles crawling over and leaving trails in the soft mud; and on the dry land we help to pull to pieces one of the hollow trees, and find within it a number of land animals, all new to science. We can understand how these discoveries came as a complete surprise to the scientific world in days when few or no reptiles were known of earlier date than the Permian, and no land mollusca earlier than the Eocene. The reader will naturally turn first to the chapters relating to the researches in the coal measures, and it is probably on the observations there recorded that the author's fame will principally rest. Sir William Dawson's exploration of the coal measures of Nova Scotia led him to devote particular attention to the natural history of that period. He studied carefully the physical conditions under which the strata were laid down, devoting special attention to the formation of underclays and to the origin of coal seams; he still stands up for the dry-soil origin of coal, and for its growth on the spot. From the origin of coal it was a natural transition to the coal-measure plants, and these the author has worked at most industriously, though the present volume only contains a summary of his researches. There is also a chapter on the air-breathers of the coal, in which the author gives an account of his explorations at South Joggins.

We do not much care for the chapters on the genesis and migrations of plants, on the distribution of animals and plants as related to geographical and geological changes, and on Alpine and Arctic plants in connection with geological history. In all such subjects the author's strong bias against evolution in any form leads him to use strange arguments. We do not wish, however, to conclude this notice with a criticism of minor points, and though unprepared altogether to praise Sir William Dawson's volume, we thoroughly recognise how much he has done for the science of geology, and we gladly welcome in this handy form a short record of his life's work.