region contains 405 species, or 60 per cent., and of these 82, or 12 per cent., are special. Lastly, the fourth region contains 291 species, or 42 per cent., and of these 126, or 18 per cent. are found in it only. No fewer than 18 of these are found in the basalt of the lesser Schneegrube, which Stein calls the "El Dorado of Lichenologists," as 16 of them are not met with elsewhere.

Stein defines lichens as being those thallophytes in which the thallus exhibits a union of gonidia, threads or hyphæ and chlorophyll-bearing, or phycochromaceous cells, or gonidia, the fruit-body containing the spores in asci. The structure of the thallus is described in full, as well as that of the reproductive organs, the spermogonia and apothecia. Spermogonia, now recognised as the male reproductive organs, have been met with in most lichens, but are as yet unknown in the genera Solorina, Myriangium, and Siphula. Usually spermogones and apothecia occur in the same plant, lichens being thus mostly monœcious, but occasionally the two kinds of organs are on different plants, as in *Ephebe pubescens*, which is diœcious. The origin of the apothecium from the ascogonium and carpogonium is described from the observations of Stahl, and the non-sexual reproduction by the pycnides with their stylospores or conidia, is also mentioned, while the formation of soredia is described as spontaneous division of the thallus. Most lichens produce soredia, and we may form a new plant, or several may unite together to form a single new thallus. The structure of the gymnocarpic apothecium with its four layers, the hymenium, sub-hymenium, hypothecium and excipulum, is detailed in full.

The division of the lichens into subordinate group calls for no remark, while to assist the student a very good analytical key to the genera is given, occupying no less than seven pages. In the description of the species the chemical reactions are given, but Stein seems very wisely to reject all species *only* recognisable by chemical tests, *i.e.*, without some structural character.

W. R. McNAB

OUR BOOK SHELF

Blowpipe Analysis. By J. Landauer. Authorised English Edition, by James Taylor and William E. Kay. (London: Macmillan and Co., 1879.)

THE writer of this treatise, as appears from his preface, has designedly restricted its scope by omitting all reactions peculiar to minerals, on the ground that most works already in existence upon the subject treat the mineralogical part in great detail, and devote comparatively little attention to its chemical aspects. This resolution is unfortunate, as the principal justification for the systematic teaching of blowpipe analysis is to be found in the facility thereby acquired in the identification of the constituents of minerals by simple means when the resources of a complete laboratory are not at hand; and by omitting all characteristic mineral reactions the interest of the work is decidedly lessened. Within these restricted limits, however, the book is a very good one and likely to be useful to students in chemical laboratories as an adjunct to the ordinary text-books on analysis, and this utility will be increased by the chapter on Bunsen's flame reactions, which have for many purposes replaced the older methods of investigation. The matter is condensed in a fashion rather unusual in works of German origin, and the arrangement is good though somewhat troublesome to use, on account of the adoption of a double system of numeration by pages and paragraphs. Neither author nor translators have, however, paid sufficient attention to the necessity, or at any rate desirability, of properly proportioning the different parts of the blowpipe. In this respect the examples figured are to be avoided, as they are far too narrow in the tube to be used with anything like comfort. We should also be disposed to give the first instead of the second place to the Plattner oil-lamp when compared with the gas-flame. The latter is undoubtedly more convenient, as saving the trouble of trimming and cleaning; but for all accurate work a good lamp or even a candle flame is generally preferable as being more readily controlled than gas. A self-acting blowpipe on the principle of the Sommellier compressor made with two bottles, a length flexible tube, and a gallon of water described on p. 5, deserves notice for its ingenuity, but such contrivances are not to be recommended in practice, for they are, to quote the words of a leading American mineralogist, "unnecessary when the student has sufficient enterprise to learn to blow the ordinary instruments, and no others will be likely to make much progress in blowpipe analysis."

The Zoological Record for 1877; *being Volume Fourteenth of the Record of Zoological Literature.* Edited by E. C. Rye, F.Z.S. (London: Van Voorst, 1879.)

IT is now just fifteen years ago since the project of the *Zoological Record* was first started by Dr. Günther. The difficulties of the undertaking were many, the labour was great, the reward uncertain. It would seem a proof, however, of there being a necessity for such a publication when we find it still pursuing the even tenour of its way, under the auspices at present of an association, and favoured by considerable money grants from the Royal Society, the British Association, and the Zoological Society of London. The original staff of recorders have now all but Dr. von Martens ceased from their recording labours and a younger generation takes their place.

The pagination is now, we observe, of a new, perhaps of a more scientific, but certainly of a puzzling type, each class having a pagination to itself, so that the sequence of the classes has first to be learnt and then only can one find the object looked for; that this may be a convenience to the printer we acknowledge, but we do not think it a commendable plan. We confess too that we like the method still adopted by some of the older recorders, of giving first a list of the more important publications in a group, then an account of the works on the anatomy and embryology of the same, next the contributions to faunas, and lastly, the new forms, &c., under their orders and families. To say the least the editor would consult the convenience of the student if he would suggest an uniformity in practise in these particulars to his staff. Thus making all due allowance for the difficulties in the way of classifying the Vermes, yet the manner in which the new genera and species are recorded makes it rather difficult to find out what has been done in this group during 1877. The editor too, for he alone could do it, might have added to the last paragraph but one treating of the worms, a reference to "Moll. 55," where pretty much the same facts are stated as we find recorded in "Verm. 21." Amid such a quantity of matter it would be simply an impossibility that mistakes should not sometimes occur, and indeed on a careful survey of this volume such have very rarely turned up. In "Ech. 5" we may remark that the notes by "G. McIntosh" referred to should be credited to H. W. Mackintosh, probably not even a relation of the person named. In "Cœl. 13" is not *Cylicozoa* a misprint for Calycozoa? At "4 Spong." we read, "Gen. *Ceratella*, Gray, and *Dihitella*, Gray, are undoubtedly the same genus, *C. labyrinthica*, sp.n. (*vide infrà*)" (why is the accent always on this *a*). We have looked both below and