

matter, though this field has been often traversed, and there is less scope for his originality. He shows us

"that it would be inelastic, and that it would intensify the inequalities resulting from unjust assessments; that, although proposed chiefly from social considerations, it would prevent the Government from utilising the taxing power for other social purposes, and that it would divorce the interests of the people from those of the Government; that it would offend against the canons of universality and equality of taxation, and would seriously exaggerate the difference between profits from land and profits from other sources; and, finally, that it would be entirely inadequate in poor and new communities, that it would generally have an injurious influence on the farmer, and that even in the large urban centres it would exempt large sections of the population without bringing any substantial relief to the poorer classes" (p. 93).

We have in this book what the title of it leads us to expect—a series of detached essays, and not any connected series of arguments, growing one out of another like the chapters of a book. There is nothing but a play of words, for example, to make "Double Taxation" follow the "Single Tax," for single and double are not used in the same senses in the two cases described. Perhaps the most important discussion in the chapter on "Double Taxation" is that on the taxation of aliens. Seligman considers that the principle of economic interest should be the guide here. We should find out from what place an individual gets his income, and in what place he spends it. "Only in this way can his real economic interests be located" (p. 111). The question is even more difficult in the United States than here, for members of different States are financially foreigners, and even the relations of Scotch law to English law do not quite help us to understand the relations of (say) the laws of New York to those of California. In the case of the United States among themselves, seeing that there is no real political severance, it ought to be easy to accept "economic allegiance as against the antiquated political allegiance" (p. 110). But between the United States as one unit, and Canada as another, for example, a critic might observe that such a view will not so readily find acceptance.

After a short chapter on inheritance taxes, we come to the taxation of corporations, or, as we should say, companies. Mr. Seligman here, as elsewhere, makes very effective use of the Swiss Federation and its difficulties as a European parallel to the case of the United States (p. 248). On the subject generally, perhaps his most striking contention is that the bonds and loans of companies should be taxed as well as their stock and shares, since the bonds and stock together form the working capital of the company, from which the said company derives its income. He thinks that in the case of an individual, on the other hand, interest on debt must be deducted from income, or else there will be double taxation (pp. 214, 215, &c.). This is one of the few cases where he does not produce conviction. The conclusion would more naturally be that all money borrowed to carry on or extend business may be included in the borrower's capital, whether the said borrower be an individual or a company.

After these essays on particular taxes comes a "Classification of Public Revenues" (chapter ix.), which

might have been better placed at the beginning of the book. It brings out the author's favourite distinction of fees from taxes. There is a good chapter on the "European literature" about taxation. The author's wide knowledge of it makes us surprised at his inacquaintance with Grote's remarks on Greek taxation (see p. 85, note).

English readers will find little to criticise in Prof. Seligman's account of the Betterment Tax (embodied in the Tower Bridge Act of 1895), and Sir William Harcourt's Finance Act of 1894. Surely, however, the Professor is wrong in supposing that we have no special assessments on landlords (p. 312). They are certainly under obligation to pay for the making of the roads in front of their property; and his description of "special assessments" fits their case exactly. Perhaps the distinction of these assessments from fees is less strongly marked than Mr. Seligman thinks; they are at least species of the same genus.

The language of the "Essays" is excellently suited to the subject, and there is no waste of it. It is just possible that love of antithesis is occasionally a snare to the writer.

"In the case of the private business the monopoly [monopolist?] seeks only the greatest possible profits; in the case of the public monopoly the Government seeks the greatest possible public utility" (p. 296).

If this were so, France would be proverbial for the excellence of her tobacco.

In a new edition perhaps the arrangement might be improved, and possibly the lesser book on "Shifting and Incidence" incorporated, so as to make the whole a connected treatise on taxation with more evident order and connection of parts. Till Mr. Seligman has done this for his book, it will not produce on the general public the impression to which its high merits entitle it.

OUR BOOK SHELF.

Handbuch der Mineralchemie. Von C. F. Rammelsberg. Zweites Ergänzungsheft zur Zweiten Auflage. Pp. 475. (Leipzig: Engelmann, 1895.)

No fewer than fifty-five years have passed since the author issued his "Dictionary of the Chemical Part of Mineralogy," and yet his energy is unabated. The present work is the second supplement to the second edition (1875) of his well-known "*Handbuch der Mineralchemie*," a treasury of condensed information relative to the results of the chemical analysis of minerals, and the supplement is a concise record of chemical work on minerals published during the last decade. As in the original treatise, the author restricts himself to the expression and criticism of observed facts, and avoids as far as is possible the discussion or even mention of constitutional formulæ. And for the purposes of the student it is doubtless convenient to have collected for him into a single treatise the observed solid facts upon which all speculation relative to the chemistry of minerals is to be based. Once more the mineralogical chemist is reminded how rarely the analysed material is truly pure, and how necessary it is to record its morphological and physical characters, the mode of its occurrence, and the nature of the accompanying minerals: it is only by regard to such records that the true composition of a mineral can in many cases be deduced. And the author points out how imperfect is our knowledge of the chemical composition of many of the commonest minerals notwith-

standing the number of analyses which have been recorded. In the case of the plagioclasic feldspars, for example, though the results of many analyses are in close agreement with the hypothesis of the admixture of molecules of albite and anorthite, there are others which deviate considerably therefrom, and are as yet unexplained. The caution of our chemical Nestor is perhaps carried to an extreme. He declines, for instance, to recognise the interchangeability of F and HO, notwithstanding the results independently obtained of each other by Penfield and Sjögren in the case of the Humite group, and by the former in the case of Topaz, and attributes the variations of composition to alteration—to loss of fluorine and gain of water. But in the case of Topaz the angle of the optic axes has been shown to be related to the percentage of the fluorine, and it is difficult to regard the variation of chemical and optical characters to be a result of mere hydration. Every one will hope that the Berlin professor will be spared to issue a third supplement of this standard work of reference.

L. F.

Elements of Botany. By J. Y. Bergen, A.M., Instructor in Biology, English High School, Boston. Pp. vi + 275 + 57. (Boston, U.S.A., and London: Ginn and Co., 1896.)

IT is very seldom that we have come across an elementary book on botany which has impressed us so favourably as the one now under review. It is intended primarily for school use, but the admirable method which is maintained throughout its pages ought to be practised in all grades of class work. A general account is given of the simple morphological and physiological phenomena of plant-life, and the student is encouraged to put the knowledge thus acquired in each section to a practical test. A selected object or experiment is indicated to him, and he is shown how to put his own questions. He is *not*, however, told the answer—that he has to find out for himself as the result of independent observation.

The work is well illustrated with more than 200 figures, and contains, besides, appendices on material and methods, a useful chapter of about fifty pages on the commoner orders and species of flowering plants inhabiting the northern and middle States.

Although the author has naturally paid special attention to the needs and opportunities of American students, his book ought to be well received in this country also, for most of the plants mentioned are readily obtainable here, and from an educational standpoint the book is quite one of the very best we have met with.

Geology. By C. L. Barnes, M.A., F.G.S. Pp. viii + 181. (London: Rivington, Percival, and Co.)

THIS is not a very remarkable addition to the already large number of easy books on geology. When we have said that the volume is readable, and a suitable one to put into the hands of beginners, we have uttered all that is demanded by the text. The illustrations are the least attractive features of the book; none of them are striking, and few, if any, of them are new. A fact to which attention may well be directed, is that the book does not follow any examination scheme.

The New Photography. By A. B. Chatwood. Pp. 128. (London: Downey and Co., 1896.)

THE "new photography" described in this book is not confined to work with Röntgen rays, but includes also accounts of colour photography, psychic photography (retinal impressions) spirit photography, and anaglyphs. The book is, to say the least, a trifle premature as regards work with Röntgen rays; and the title, as well as the shadow of the bones of a hand, printed upon the title-page, is misleading as to the contents.

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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.]

Dr. Ball's Two Letters on the Ice Age.

SIR R. BALL's last letter is a little embarrassing for those who have accepted his teaching. In it he claims that however faithless his other supporters may have proved, he can still rely on the countenance of Dr. Wallace. What does it all mean? Dr. Wallace is responsible for a theory of the Glacial period which has been before the world for many years, and which is entirely different both in essence and in its consequences from that proclaimed in "A Cause of the Ice Age." Are we to understand that Sir R. Ball has adopted Dr. Wallace's theory, or is it Dr. Wallace who has adopted Dr. Ball's? The differences between us are so important in view of modern geological conclusions, that I may be perhaps permitted to condense a few simple issues in a few questions. I could add more if necessary.

Sir R. Ball says he has not changed his views. Does he still then hold, as he once did, that astronomical causes alone will suffice to produce an Ice Age, or does he now hold with Croll and J. Geikie and Dr. Wallace that they will not, and must be supplemented by other causes?

Does he still maintain, as he maintained in the new edition of his book, the old-fashioned theory as to the laws of radiation, or does he believe in Stefan's law, which entirely alters the whole basis of the case, both as taught by himself and by Croll?

Does he still maintain that the Kabbalistic figures 63 and 37, which represent a constant and invariable factor, whatever variations there may be in the eccentricity of the earth's orbit, and which therefore cannot induce variability of climate, are not only the efficient element in producing an Ice Age, but represent, as he states in his work, the proportions of summer and winter heat received in the latitude of Britain either now, or at any time?

On page 27 of the same edition Dr. Ball says: *Our hemisphere was once covered with ice.* Does he still maintain this, the most extravagant doctrine ever propounded by a Glacialist?

In his first letter to you, Dr. Ball admitted that Mr. Culverwell's calculation of the distribution of the sun's heat over different zones of the earth at present, and during the period of extreme eccentricity, is unassailable, but that the result is affected by convection of heat from other places. How does he reconcile this view, which was Croll's, and is also Mr. Culverwell's, with any part of the argument in his book, which was written, as he says, to enable us to dispense with other than astronomical causes?

Lastly, Sir R. Ball professes to account for the Ice Age—that is, the Glacial period of the geologists. In doing this he contrasts the effects of present eccentricity with the effects of the limit of extreme eccentricity as calculated by Leverrier and Stockwell. Does he seriously argue that the great Ice Age took place 850,000 years ago? As he well knows, we must go back to that period before we get a disparity of the seasons amounting to thirty-three days, and any time during the last 300,000 years this disparity has been always very much less. Is it either ingenuous or right to treat this extreme variation as a factor in any possible range of speculation on the Ice Age?

As I said, I could add largely to these issues; but they will suffice. The matter is not a private difference of opinion. It is one upon which the basis of a great deal of geological reasoning must be founded.

HENRY H. HOWORTH.

30 Collingham Place, Earl's Court,

March 11.

The Röntgen Rays.

So many people are buying tubes for the "new photography," that I think it ought to be made known that the best results can be obtained with the original spherical tube used by Prof. Crookes in 1879, to show the incandescence of platinum under impact of the projected molecules which were focussed on it by a concave cathode. I have been using such a tube for my best work up to now. On January 29 last, I put in hand a larger tube of the same kind, with the same large concave cathode at the top and small disc anode at the bottom, but without the platinum in the middle. This tube is six inches in diameter. But the tube-makers have been so occupied with smaller tubes,