quately considered, and also the advantages of the trolley omnibus when acting as a feeder for electric tramways.

The latter part of the book is devoted to petrol-electric vehicles and electric railways, while a chapter is included which deals with electric traction curiosities. A full description is given of the system and working of the Metropolitan District Railway, the London, Brighton, and South Coast electrified line, and the "Underground" Tube combination and the other tubes.

With regard to the petrol-electric systems, some interesting facts are given dealing with its aspect with regard to marine propulsion as advocated by Messrs. Durtnell, Mavor, and others. The advantages of the system, if successfully applied to warships and liners, would be enormous, but at present it has not got very much beyond the experimental stages, though there is hope that it may prove its worth in the near future.

Finally, the monorail systems are described, together with some other general arrangements of self-contained generating stations on wheels, &c., making, with the previous chapters, an interesting summary of the history of electric traction from its commencement to the present day.

*British Ferns: a Pocket "Help" for the Collector.* By F. G. Heath. Pp. x+130. (London: Sir Isaac Pitman and Sons, Ltd., 1911.) Price 2*s.* net.

THE author's knowledge of fern species and their habitats has been manifested in previous publications, so that one is prepared to find this real pocket-book, measuring $6\frac{1}{2}$ by $3\frac{3}{4}$ inches, a trustworthy and desirable acquisition when making an excursion in quest of ferns. Forty-five species are enumerated, but varieties with one exception are omitted. The descriptions are written primarily for the amateur collector, and serviceable assistance is provided in the illustrations. The information is tabulated under the headings frond length, description, usual habitat, and localities. The list of localities, given as fully as possible, represents an arduous piece of work. Certain introductory sections are prefixed, of which the two giving definitions and general habitats are most desirable and helpful, but the others are imaginative rather than scientific; it is not necessary to go beyond the statement that every point of the germ (sporeling) is equally ready to produce roots or a stem. Disregarding the first four sections, the book provides a compact, informative guide.

*Aërial Locomotion.* By E. H. Harper and A. Ferguson. With an introduction by Prof. G. H. Bryan, F.R.S. Pp. xii+164. (Cambridge: University Press, 1911.) Price 1*s.* net.

POPULAR handbooks on aërial navigation are now issuing from the press in a constant stream, and as their number grows the reviewer naturally judges of each new arrival by comparing it with its forerunners.

The exact public for which the little book under notice is intended is difficult to determine. The book is accurate, but it is dull; it is unattractive, and is poorly arranged. We cannot imagine the book being read for amusement, as the style is difficult to follow, or for information, owing to the absence of shoulder-notes, index, sectional arrangement, and other of the common aids to study.

Clarity of expression is lacking in very many places, while the sentence on p. 60, "If the elevator is carried normally in a different position during flight, all the conditions of flight are changed," is quite incomprehensible.

As has been said, the book is accurate, but it is scarcely calculated to attain its apparent object of interesting the public in the science of aëronautics.

*Nature's Pageant: The Story of the Seasons.* By Margaret Cameron. Pp. iv+120. (London: Blackie and Son, Ltd., 1911.) Price 1*s.*

THIS little book is an attempt to teach nature-study to children of seven years of age. They are supposed to read the simply-worded story, in which plants and animals talk, and to look at the pictures. In our judgment, nature-study lessons are of little value unless they are concerned with the observation of the objects themselves; and such attempts as are here given to combine information with imagination are not the best means of cultivating interest in literature or science.

*Assaying and Metallurgical Analysis. For the Use of Students, Chemists, and Assayers.* By E. L. Rhead and Prof. A. H. Sexton. Second edition. Pp. x+451. (London: Longmans, Green and Co., 1911.) Price 12*s.* 6*d.* net.

THE differences between this edition and the preceding one are not important. A few new methods are included, such as the determinations of copper and of iron by titanous chloride and the volumetric estimation of nickel by cyanide, but the text generally remains unchanged, and the merits and occasional defects of the book have not been modified. It is still one of the most useful works on the subject available.

## 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.*]

### On the α-Ray Theory of Aurora Borealis.

IN a letter to NATURE of April 13 (vol. lxxxvi., p. 213) I gave reasons for the view that at least some of the forms of aurora borealis are caused by a type of rays which, as regards absorption by matter, follow the same law as α rays from radio-active substances. In the letter I also mentioned that the diurnal distribution of aurora apparently would require a negative charge of the rays.


My arguments which lead to a negative charge was based on the assumption that the simplest orbits, like that of (*a*), ought to occur more frequently than the more complicated, like that of (*b*), both of which are theoretically possible. This assumption, which indeed might seem legitimate, is not, however, a consequence of exact mathematical calculation, for the problem of finding the relative probability of the occurrence of the various possible orbits has not yet been solved.

Further, an exact determination of the diurnal distribution of aurora is made difficult through the effect of sun- and moonlight; but, even if we take it for granted that the aurora are most frequently found on the evening side, there is, so far as our present knowledge goes, no necessity for assuming a negative charge of the cosmic rays.

Moreover, the explanation of the thin drapery form, given by Störmer,[1] requires orbits like (*b*) having turned round the magnetic axis a great angle, and if such an orbit is going to strike on the evening side a *positive* charge is necessary. These matters will be more fully discussed in a subsequent paper.

There are some other points not mentioned in my previous note which are of considerable interest. In order to explain from the radiation theory the formation of thin drapery bands, a strictly homogeneous radiation is neces-

[1] Arch. des Sci. Phys. et Nat., 1907.