

press, is little more than a reprint of the first. But the plates are a welcome addition. They represent seventy-three species, without colour, carefully drawn and easily recognisable, though sometimes badly printed. The small size of the book renders it very convenient for handy reference. A European entomologist will recognise one or two old friends, such as the Camberwell Beauty, the Painted Lady, Red Admiral, and a Small Copper, hardly distinguishable from our own; but the proportions of the various families and genera are very different from what obtains in Europe. A single plate, representing five species, and another representing only six species, are enough to illustrate the Satyridæ, and the Blues and Coppers together; while a much more crowded plate is required for the Hair-Streaks, and two for the Skippers. There are also several very large and conspicuous species, including six large Swallow-Tails, and the northern representatives of several tropical genera. But although the average size of the North American butterflies is much larger than ours, and much of the settled part of the country lies much further south, the number of species in the Northern States is much smaller than in Europe, owing to the comparative absence of Satyridæ and Lycænidae; and it is not till we reach the frontiers of Mexico that the vast wealth of the tropical American butterfly fauna (almost equalling that of all the other continents put together) begins to dawn upon us.

W. F. K.

Elements of Qualitative Analysis. By G. H. Bailey, D.Sc., Ph.D., and G. J. Fowler, M.Sc. Pp. 115. (Manchester: J. E. Cornish, 1900.)

AMONG the distinctive characteristics of this addition to the already numerous volumes on practical chemistry are: the prominence given to the recognition of common elementary substances by an examination of their simple physical and chemical properties, the attention given to dry methods of analysis, and the series of flame-reactions. These sections provide students of practical chemistry with excellent exercises in manipulation, and will counteract the belief that the best way to analyse a substance is always to dissolve it and go through the usual routine treatment of solutions and precipitates. There is little sympathy with ordinary qualitative analysis at the present time, but where the subject is taught it should be taught intelligently; and as this little book provides a reasonable course of laboratory work, it merits a trial.

LETTERS TO THE EDITOR.

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Railways and Moving Platforms.

ABOUT twenty years ago I was in the habit of speaking with Prof. Ayrton and other friends about a scheme which might increase ten-fold the carrying capacity of the Underground Railway. I prepared a letter for the *Times* newspaper about two years ago, but at the earnest entreaty of a friend I applied for patent protection for the scheme, and did not publish the letter. I have not proceeded with the patent, and wish now that I had published the letter. Indeed, I wish that, instead of merely talking the matter over with friends twenty years ago, I had published what I had to say.

Travelling now on the new Central London Railway, one feels that there is enormous waste of energy and of time in starting and stopping the trains. Again, a train must not be longer than the platform. On my scheme the train does not stop, and the longer it is the better. Indeed, I can imagine an endless train keeping a perfectly constant speed all the time.

My scheme is easy enough to understand now that moving platforms are common. After passengers enter a station I get

them gradually into a state of motion, so that moving alongside the train and at the same speed, they may enter and other passengers may leave. There are many ways in which the scheme may be carried out. From a wayside station passengers may enter an express train which does not stop, in the following way. They enter a small train at the station; this train gradually gets up a speed equal to that of the express; it runs alongside the express at a particularly well-laid part of the line; there is an exchange of passengers, and the local train gradually comes to rest again at the station.

For the Underground Railway, the method which most commended itself to Prof. Ayrton and me long ago was this. At a station, say St. James's Park, the platform was a carefully constructed turntable, 500 feet in diameter, the rim of which travelled at 8 miles per hour. The whole area was not really a floor; it was only a skeleton of a turntable, being an outer rim 8 feet broad and many radial passages. The very long train to Mansion House, travelling at 8 miles per hour, was close to the rim of the turntable; indeed geared with it in a rough, simple manner for less than half its circumference; the train from Mansion House did the same on the other side. I need not speak of the automatic opening and closing of the doors of the train.

A passenger, let us say second class for Mansion House, takes his ticket and descends a spiral staircase, which revolves so slowly that even the frailest and most timid of old ladies is not frightened; in fact, it revolves on its own axis once in 134 seconds. At the bottom the passenger sees a few notices; one of them saying second class, Mansion House, has a hand pointing along a radial passage, and this is followed. As the passenger moves radially, he does not notice that he is gradually getting up speed circumferentially. He does not notice that the floor gets slightly inclined as he moves out, to counteract the small effect of centrifugal force. When he reaches the outside of the platform he probably finds a train there, seemingly at rest, with the doors open, and he enters it, moving perhaps along the platform, choosing one compartment rather than another. If he is lucky he has about one minute in which to make his choice. But he will notice near him on the platform an altering time signal which tells him how much more time he has to waste: 50 seconds, 40, or 30, or 20, or 10; if he delays after the signal says 0, an iron railing will come between him and the train; he will see the train moving laterally away from the platform, and he must wait seventy-four seconds before he sees a train coming laterally towards him; the railing goes away, and he has again sixty seconds in which to enter.

If he had a third class ticket to South Kensington, he would have proceeded in exactly the same way. Also every passenger wanting to leave the train at St. James's Park had sixty seconds in which to do it. Trains at 16 miles an hour give only half these times. A platform of only 250 feet diameter would give only half the time if the train speed was 8 miles an hour. I need not dwell upon the details of this and other methods which suggest themselves. It may be soon or syne, but I feel sure—I have felt sure for many years—that my method will have to be adopted.

JOHN PERRY.

August 11.

Snow-drifts on Ingleborough.

IN his interesting letter on "Snow-drifts on Ingleborough in July," Prof. Hughes describes what may be called the first stage in the formation of a *glacière*. These ice-caves, not very rare in parts of the Alps and Jura, were made by the present Bishop of Bristol the subject of an attractive book (published thirty-five years ago), and have been occasionally noticed in the earlier volumes of NATURE and elsewhere. I have always believed that snow, drifted into caves during the winter, was the initial cause of these natural ice-houses (about half a dozen of which I have visited), and can quote a case from the Alps which is a slight variation of that described by Prof. Hughes. On July 24, 1873, I went up the Pic d'Arzinol (9845 feet) from Evolena in the Val d'Hérens, and on the way down—so far as I remember between five and six thousand feet above sea-level—my guide diverged from the track to show me what he called the Pertuis Freiss. These were two fissures, apparently joints, opened by a slight subsidence. A description of one will serve for both, except that there was hardly any descent to its floor. The fissure extended some four yards into the hill, and was at widest about as many feet. Ice was patched about the floor, and in places