Apart from the relatively minor points just mentioned, the chart will probably prove of considerable service to lecturers of chemistry by relieving them of the necessity of preparing the large diagram illustrating the periodic classification which is now essential for class teaching of chemistry.

Leitfaden der Biologie für die Oberklassen höherer Lehranstalten. By Dr. O. Rabes and Prof. E. Löwenhardt. Pp. x+248. (Leipzig: Quelle and Meyer, 1910.) Price 3 marks.

THIS book is intended for the use of pupils who have already had a certain amount of biological training in school. It covers a very great deal of ground in a very superficial manner, but in the hands of a capable teacher it should serve as a good foundation for an extremely interesting course of general biology. It commences, in what we conceive to be a very logical manner, with a general account of the cell, but the fact that this occupies less than one page is typical of the superficial method of treatment. A few unicellular organisms are then dealt with, chiefly from the physiological point of view.

The general physiology of multicellular organisms comes next, and the first part concludes with a description of seventeen types of plants and animals, ranging from bacteria to the bean in the vegetable series, and from Paramœcium to the rabbit amongst animals. The descriptions and illustrations of these seventeen types occupy twenty-six pages! The type system has become almost vestigial.

The second part of the book is devoted to the dependence of organisms upon their environment (œcology), including geographical distribution and an appendix on the geological history of plants and animals and the theory of descent. The third part deals with man, mainly from the physiological, ethnological, and palæontological points of view.

The book is very copiously and admirably illustrated, but four or five volumes of its size would be required to do justice to the subject-matter.

Tarr and McMurry's Geographies. The Five Book Series. First part, Home Geography. Pp. xi+112. Price 2*s.* 6*d.* Second part, The Earth as a Whole. Pp. ix+168. Price 2*s.* 6*d.* Third part, North America. Pp. xix+469. Price 4*s.* 6*d.* Fourth part, General Geography, South America and Europe. Pp. xvii+378. Price 3*s.* Fifth part, Asia and Africa. Pp. ix+214. Price 2*s.* 6*d.* By Prof. Ralph S. Tarr and Prof. Frank M. McMurry. (New York: The Macmillan Co., 1908, 1909, 1910.)

THE authors, who are well-known writers on geographical subjects from the point of view of the school, have evidently taken great pains to adapt themselves to the needs and capabilities of young pupils. On the whole, they have been successful in producing a good, workable course of school geography. Written primarily for American boys and girls, great prominence is given to the geography of the United States and less importance to that of the British Isles. When it is pointed out, however, that while 230 pages are devoted to the United States, the British Isles are disposed of in 35 pages, it will be seen that the volumes are hardly suitable for adoption as class-books in our schools. But they should prove of great assistance to our teachers in showing how geography may be taught in a way to arouse interest and develop thought. Every part is well and profusely illustrated with views, diagrams, and photo-relief maps. In addition there are numerous coloured political maps, but no use appears to be made of coloured orographical maps.

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.*]

Koch's Discovery of the Method of Plate-culture of Micro-organisms.

READING the interesting notice of Robert Koch which appeared in NATURE of June 2, I was reminded of an incident mentioned concerning his early scientific career in the preface to Cohnheim's "Gesammelte Abhandlungen." Cohnheim, the pioneer of what has been sometimes termed physiological pathology, died in 1884 at the early age of forty-five. The preface to his collected works, published in the following year, contains a charmingly written memoir of him from the pen of his friend W. Kühne, the accomplished Heidelberg physiologist. The obituary notice of Koch in NATURE rightly stressed the immense value to bacteriology of his invention of the plate-method for obtaining pure cultures of micro-organisms. The incident reported by Kühne in his memoir of Cohnheim has reference to that, and to Cohnheim's contact with Koch in consequence of it in the year 1875. At that time Cohnheim was already full professor of pathology in the University of Breslau, and his brilliance as an investigator was already attracting to his laboratory men of promise from all parts. Koch, on the other hand, was in country practice in Silesia, and quite unknown to the scientific world. Koch's discovery of the plate-method led to Cohnheim's discovery of Koch, and the enthusiasm and remarkable prevision at once shown by the young professor of pathology regarding his unknown compeer, only two years younger than himself, are strikingly told by Kühne. His words run:—

"In November, 1875, Robert Koch wrote begging Cohn, the celebrated botanist, Professor of Botany in the University, to look at cultures of anthrax bacilli which he (Koch) had prepared pure; and for that purpose Koch went to Breslau to see him. Cohn had had many tiresome and disappointing experiences of cultures of pathogenic organisms brought to him with the assertion that they were of pure and isolated species; in the present instance he naturally felt at first little confidence, but after interviewing Koch he sent a messenger to the Pathological Institute asking someone to come over because a visitor, Dr. Koch, had something to show which was 'quite right and very interesting.' In the Pathological Institute, Weigert, Cohnheim's assistant, was about to perform an autopsy; Cohnheim himself therefore went across to the Botanical Laboratory, and when he returned he said, 'Now leave off everything here and go over to Koch. The man has made a tremendous discovery, which for its simplicity and its accuracy of method deserves admiration all the more because Koch himself is living entirely remote from scientific intercourse, and has done it all by himself and finished it right out. There is nothing whatever to add to it. I regard it as the greatest discovery in the whole field of bacteriology, and I believe Koch will surprise us all in times to come with further discoveries and put us all to the blush for our laurels.'"

Perhaps this picturesque reference to a turning point in Koch's earlier career, being contained in a volume little likely to be sought for information about him, might escape the notice of some whom it would interest, especially at the present time.

C. S. SHERRINGTON.

The University, Liverpool.

Crocodiles and Sleeping Sickness.

IN the obituary notice of Prof. Robert Koch in NATURE of June 2 (p. 404), it is stated that "Koch suggested that the crocodile might be the reservoir host of the trypanosome that gives rise . . . to sleeping sickness." This is a statement that has been made very often, especially in the daily Press, but which I, for my part, have never been able to verify, although I have some acquaintance with Koch's writings on the subject of sleeping sickness. Since this idea has been attributed so often to Koch, it is doubt-

less safe to assume that there is some foundation for doing so, and I should be very glad to learn when and where Koch made the suggestion that the crocodile is a reservoir host for sleeping sickness. The point is merely one of historical and bibliographical interest, since in his latest writings Koch expressly repudiated the idea of any such connection between crocodiles and sleeping sickness (see NATURE, February 18, 1909, p. 458, and May 5, 1910, p. 279; also the Bulletin of the Sleeping Sickness Bureau, No. 11, November 5, 1909, p. 421, footnote).

E. A. MINCHIN.

Lister Institute of Preventive Medicine, Chelsea Gardens, S.W., June 8.

PROF. MINCHIN'S letter comes as a reminder, so often repeated, and apparently not too often, that one should verify one's references. I had read a leading article in the *Lancet* of October 30, 1909, on the work of the German Commission, but I had not referred to the original report, and I am afraid that the statement that the *Glossina palpalis*, on occasion, takes its nutriment from the unprotected parts of the crocodile led me somewhat astray as to the exact significance of Koch's observations and recommendations. I am glad that Prof. Minchin has directed attention to the matter. *My* excuse must be that the article had to be in the hands of the editor within a few hours of my receipt of a re-directed telegram, and that I had to depend upon my memory for almost everything but a few dates and data which appear in "Wer ist's."

THE WRITER OF THE ARTICLE.

The Earth and Comets' Tails.

IN spite of the unreserved predictions of astronomers, the earth did not pass through the tail of Halley's comet on May 18–19, nor subsequently. The tail as seen in the morning sky, previous to the transit of the comet across the sun's disc, appeared like a long and straight beam of light stretching from the horizon to Aquila. It was noticed from day to day that the tail was practically fixed in position in the sky. We rather expected the tail to get nearer to Venus and Saturn as the comet approached the ecliptic, but it remained stationary. On the morning of transit, May 18–19, the tail was unchanged, but a second branch to the south was now noticed. It joined the northern branch to the east of the Square of Pegasus. Unfortunately, this southern branch was near the zodiacal light, and only distinguished from it with difficulty.

Both these tails were seen morning by morning, including this morning (May 22, Civil day), but they have diminished in brightness, and were difficult to see. Further observation of these will be impossible, because of the moon remaining above the horizon until after dawn during the next ten days. The whole eastern horizon where the tails meet and where the zodiacal light is was suffused with a dim and indefinite glow, which was particularly noticeable on May 18–19 and 20–21. This glow was not so definite in boundary as the zodiacal light. When the comet was seen on the evening of May 20 we were surprised to see it had the ordinary tail pointing away from the sun as usual. It had been noticed for several days that in the neighbourhood of the sun the sky was not so blue as usual, but this was the case even a week before the transit, and is probably merely a meteorological phenomenon. This brief summary of the facts will suffice here; the observations in detail will be published elsewhere.

We have now to explain the reason why the earth did not pass through the tail of the comet, and why the tail broke up so that some of it was left in the morning sky, where it remains, and is slowly losing its luminosity, and some (or another tail) appeared in the evening sky. It is well known that a comet under the sun's radiant action (I do not attempt to define it more closely) expels corpuscles towards the sun which the sun repels, and these luminous corpuscles form the tail. This process goes on even when (as in the case of Halley's comet) the distance between the comet and the sun exceeds the distance of the earth from the sun. If the nearer planets do not show tails it is because these corpuscles have been shed by the planets ages ago. In short, a comet and a planet under the radiant action of the sun, and the sun itself, all repel these corpuscles. This being so, it is impossible for the earth to go through the tail of a comet—it simply repels the tail, and, as a consequence, instead of a passage through it, a disruption near the time of passage must occur, one part being left in the (in this case) morning sky, whilst a new one is developed in the evening sky. Here I may remark that on the evening of May 20 the measured length of the new tail was 19°, on May 21 32°, and on May 22 it was 40°.

Again, the earth is bombarded with meteorites, which are also throwing off corpuscles. These will be repelled by both earth and sun, so that if we look at the part of the sky opposite to the sun we should, and do, see the faint tail thus formed which is known as the Gegenschein. This simple theory explains all the facts of observation, and, if it is correct, will save nervous individuals some worry when the next near approach of a comet's tail is imminent.

R. T. A. INNES.

Transvaal Observatory, May 22.

P.S.—Mr. H. C. Reeve, of Lorentzville, under date May 22, has sent me a letter conveying the same idea. He says:—"Whatsoever nature the stress between the sun and the comet may be which causes the repulsion of the tail . . . the same stress must also exist between the earth and the comet . . . under these circumstances the earth could not possibly pass through the comet's tail."

ON the morning of May 19, at between 4 and 4.30 a.m. standard Indian time (5⅛ hours from Greenwich), the tail of Halley's comet could be seen stretching as far as the Milky Way near Sagittarius, if not beyond. The tail was much fainter than it had been two or three days previously, but was still quite distinct.

In the constellation Sagittarius, however, a dark band, like a shadow, stretched diagonally right across the tail upwards from east to south at an acute angle of about 20° to 30° with the direction of the tail. The edges of the band were approximately straight and parallel, and the width of the band was perhaps two or three degrees.

No luminosity could be noticed within the band.

If, as seems probable, the tail was then entering into the shadow of the earth, it would appear that at any rate the major portion of the light of the tail was light reflected from the sun.

A. S. HEMMY.

Government College, Lahore, Punjab, May 26.

The Term "Radian" in Trigonometry.

NATURE of April 21, containing Mr. Thomson's letter, has just reached me, and I hasten to say that, had I known that his father had ever claimed to have originated the word "radian" I should, of course, have mentioned the claim in my communication to NATURE of April 7. As a matter of fact, Prof. Thomson never did so in my presence, and he certainly knew shortly after he came to Glasgow that I had on my own initiative proposed the word, and had made use of it for some years. One day when I met him accidentally he told me that he had found a college student who had been a pupil of mine using the word "radial" for a unit-angle, and that, while agreeing with me as to the need of such a word, he had doubts as to the suitability of the terminal syllable. My reply, as may be guessed from my recent communication, was that "radial," "radian," "rad," had all something to be said for them, and I referred him to my letter to NATURE dated April 4, 1870. On at least two subsequent occasions we spoke of such things, and he supported the termination *-an* in this particular case, because of a supposed analogy with the geometrical term "median." All this, you will see, does not preclude the possibility of an independent origination of the term by him in July, 1871, as stated by Mr. Thomson, and I therefore regret that here there is no chance of me having the satisfaction of seeing the printed word in the Calendar of Queen's College, Belfast, for 1873–4.

May I direct attention to the fact that in justification of his letter Mr. Thomson unfortunately represents me as saying that it was in 1874 that "the word was finally adopted"? This is quite incorrect. If he will kindly