recollection while conducting a course for students. But it is perhaps not often that short notes of this kind are of very much service to anyone except the man who put them together.

Lessons in Elementary Tropical Hygiene. By Henry Strachan. Pp. xi+116+vi plates. (London: Constable and Co., Ltd., 1913.) Price 1s. net.

WE heartily recommend this little book. It is, of course, quite simple and very elementary; that is what it was intended for. Still, London school-teachers will find many useful hints in it. But it is written chiefly for the help of school-teachers in the tropics, both in Africa and in the West Indies. The author has been Principal Medical Officer of Lagos and of Southern Nigeria, and for two years he was acting as Colonial Secretary in Lagos. If he does not know the feel of the white man's burden, who does? And he knows well that the way to put things right in this world is to get at the children. It is they who will hold the ground which our men of science have won in the tropics. The victories of protective medicine and of sanitary administration over tropical diseases in Africa are, to us older people, still new, still wonderful; to the children, before many years are past, they will be old stories retold, facts taken for granted.

Anaesthetics: their Uses and Administration. By Dr. D. W. Buxton. Fifth edition. Pp. xiv+477. (London: H. K. Lewis, 1914.) Price 10s. 6d. net.

THE advances in the knowledge of anæsthesia and analgesia made it necessary for Dr. Buxton to rewrite most of the sections in the previous edition of his useful work, to delete obsolete apparatus and theories, and to add much new matter. Among other new features are the procedures involved in giving nitrous oxide and oxygen in major surgery; of ether by the open method, by intra-vascular infusion, by intra-tracheal and pharyngeal insufflation, and by colonic absorption; the methods of local regional and spinal analgesia; and the employment of alkaloids in analgesia and anæsthesia.

Defensive Ferments of the Animal Organism. By Emil Abderhalden. Third enlarged edition. English translation by Dr. J. O. Gavronsky and W. F. Lanchester. Pp. xx+242. (London: John Bale, Sons and Danielsson, Ltd., 1914.) Price 7s. 6d. net.

THE first German edition of this work by the director of the Physiological Institute of the University at Halle a/S. was reviewed in the issue of NATURE for September 19, 1912 (vol. xc., p. 66). That two further editions were published in Germany in the following year is good evidence of the increasing interest being shown in Abderhalden's methods. The English edition will serve to bring these researches within the range of English students to whom the German text has been inaccessible.

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LETTERS TO THE EDITOR.

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Cellular Structure of Emulsions.

ON Prof. Kerr Grant's letter (p. 162) see for previous observations of this striking phenomenon Prof. James Thomson, Proc. Glasgow Phil. Soc., February 15, 1882, reprinted in his collected Papers (p. 136); also by reference given in a footnote to the reprint, to more detailed and independent investigations by Prof. Bénard, of Bordeaux, in *Annales de Chimie*, 1901, and more recent papers, including a recent lecture to the Société de Physique, and to their discussion in connection with the solar phenomena referred to by Prof. Grant, by H. Deslandres, in the *Annals of the Observatory of Meudon* (vol. iv., 1910).

JOSEPH LARMOR.

THE cellular arrangement of convection currents in emulsions, described by Prof. Kerr Grant in NATURE of April 16, was first recorded by E. H. Weber in 1855, with gamboge suspended in a mixture of alcohol and water. It is discussed in O. Lehmann's "Molekularphysik." The structure is most conveniently seen in molten wax or spermaceti, and in this form was discovered by H. Bénard. Many papers by Bénard, Dauzère, and others have appeared on the subject in the *Comptes rendus* and *Journal de Physique* since 1901, and the possible bearing of the phenomenon on geological and astronomical problems has been discussed. A paper by James Thomson on cellular structure due to convection, originally published in 1882, is included in his collected works. In this case soapy water was the liquid used. An account of the phenomenon, with references, is given in the present writer's report to the Beilby Prize Committee, read at the March meeting of the Institute of Metals.

CECIL H. DESCH.

Metallurgical Laboratory,
University of Glasgow.

The Origin of the Moon and the Earth's Contraction.

IN my letter to NATURE of February 26, I said that, with the earth's radius and gravity at their present values, and with the speed of rotation assumed to be one revolution in five hours, gravitation would exceed the centrifugal force until a distance from the surface was reached of more than double the earth's radius. Dr. Ball upon this writes that I "concluded" that when the moon was detached from the earth, "the earth's radius must have been about three times its present one." I did not mean to imply this.

The whole subject of the moon's origin is highly speculative, as Sir G. H. Darwin himself admitted. There are two causes that might be invoked to account for the separation of her mass from the earth, viz., centrifugal force, and the sun's tidal action. These require different speeds of rotation. In Pratt's "Figure of the Earth," 4th ed., art. 102, he shows that with a homogeneous earth the time of rotation which would render the centrifugal force equal to gravity would be one revolution in two hours and twenty-four minutes. I think that if the central parts were the more dense the speed would be rather greater. It seems impossible that a solid crust could have formed at this early period, when the spheroid could only just hold together. The eccentricity would then have been about 0.22.

The other possible cause of separation would be that the times of the tide produced by the sun's attraction coincided with the period of gravitational oscillation of the mass of the spheroid; that is, that the period of free oscillation would be the same as that of the forced oscillation due to the solar tide. After this had gone on for some while, the tidal protuberances would become so large that, in the opinion of Sir G. H. Darwin, one (or both) might break away. He considered that the rate of rotation in this case would have been about one revolution in five hours. And it was this rate that I assumed in my letter to NATURE. By the time the earth's rotation had been reduced so far as this, it does not seem impossible that a crust might have been formed.

If the material which now constitutes the moon was in any way detached from the earth, the matter so detached cannot have coalesced into a single sphere until Roche's limit was passed, which would be 2.44 of the earth's radii from its centre. During this initial stage of the moon's existence the nearest analogy seems to be found in Saturn's rings. But the difficulty remains why the matter detached should not have fallen back again.

As regards the formation of mountains by the contraction of the earth, I have discussed the question to the best of my ability in my "Physics of the Earth's Crust," and have come to the conclusion that the theory is untenable.

O. FISHER.

Graveley, Huntingdon, April 4.

Movements on Water Surfaces.

I HAVE often wondered what is the real explanation of the following observation. If on a bath of soapy water a skin is allowed to collect on the surface, and then lumps of soapy lather be allowed to drop from one's hands on to it, the skin will crack in all directions, radiating from the point where the skin was first pierced, and this will continue for some time after the initial cause of the disturbance has ceased. The phenomenon is very striking, and can be repeated several times, after which the effect cannot be produced. Also if a cake of wet soap be placed on a wet level surface, the moisture is repelled from the cake, until the latter becomes surrounded by a dry patch. These seem to suggest repulsion of similarly electrified bodies.

EDWARD A. MARTIN.

MR. MARTIN'S second question is more easily answered than his first. The surface tension of clean water is about three times as great as that of water containing soap, so when the soap touches the wet surface the surrounding wet being no longer pulled towards the soap as strongly as it is pulled away, obeys the latter force as fast as it can.

I am inclined to think that his first observation may relate to a similar phenomenon, but of this I am not sure. With oleate of soda a very small quantity reduces the tension to the lower limit at once, and with this I do not think the experiment would succeed. I can only suppose, but I do not know it as a fact, that with the soap used first a scum is formed, and then when fresh lather breaks this at a point there is rather less surface tension at this point than there is in the surrounding surface. If so, the result observed would naturally follow. I should not, however, have expected to find this difference in the surface tensions. Or, possibly, the lather from the hand is warmer and for this reason has somewhat less surface tension. I have often shown in a striking way the diminution of surface tension with rise of temperature by holding the hand steadily against one side of the rainbow cup when the film upon it is already thin and highly

coloured. Almost immediately a circulation is set up and a stream leaves the part warmed by the hand, and crossing the film diametrically, curls round on either side, producing a tree-like pattern in other colours. The film is very sensitive to temperature changes.

C. V. BOYS.

66 Victoria Street, London, S.W., April 24.

X-Ray Spectra.

J. HERWEG (*Berichte der Deutschen Physikalischen Gesellschaft*, Heft 1, 1914) using a crystal of gypsum, obtains by means of the photographic method the result that the α and β lines of the tungsten X-ray spectrum coincide with the α and β lines of the platinum X-ray spectrum, the values of the glancing angles being $4^\circ 56'$ and $4^\circ 16'$ for the α and β lines respectively. But there is reason to suppose that the wave-length of X-rays characteristic of an element varies inversely as the square of the atomic weight of that element. If this is so, we can calculate from the experimental results for a platinum antikathode obtained by Herweg the glancing angles for the tungsten X-ray spectrum and we obtain:—

Tungsten Antikathode (Calculated).

Spectrum line	α	β	γ	δ	ϵ
Glancing angle	$5^\circ 34'$	$4^\circ 48'$	$4^\circ 43'$	$4^\circ 6'$	$3^\circ 51'$

We thus see that the calculated values of the β and δ lines are nearly the same as the experimental values found by Herweg for what he calls the α and β lines of the tungsten spectrum.

G. E. M. JAUNCEY.

Physical Laboratory, University of Toronto,
March 30.

An Optical Illusion.

I HAVE often noticed the phenomenon mentioned by Mr. J. W. Giltay in NATURE of April 23 (p. 189). In the position in which he was reading the sunlight passed through his eyelids and the coats of his eyes, and on account of having to pass through a layer of blood which acted as a red screen his retinas become flooded with red light. The red is not noticed where it is diluted with white, but the print appears red because red light is falling on the portions of the retina which receive the images of the printed letters.

F. W. EDRIDGE-GREEN.

SOME LIFE-HISTORIES AND HABITS OF INSECTS.¹

(1) IN his "Insect Biographies," Mr. J. J. Ward has written a pleasant and popular account of the life-history of several of our best-known insects. He has contrived to show how full of interest are the facts concerning the growth, development, and general mode of life of the subjects of his pen and camera, without overburdening his pages with technicalities, or, on the other hand, being guilty of inaccuracy or looseness of statement. The photographs with which the book is plentifully illustrated have been in almost every instance taken directly from living specimens in their natural attitudes and surroundings, and their execution must have involved the

¹ (1) "Insect Biographies with Pen and Camera." By John J. Ward. Pp. 206+plates. (London: Jarrold and Sons, 1913.) Price 6s. net.

(2) "Lebensgewohnheiten und Instinkte der Insekten bis zum Erwachen der sozialen Instinkte." Geschildert von O. M. Reuter. Vom Verfasser revidierte Uebersetzung nach dem schwedischen Manuskript besorgt von A. u. M. Buch. Pp. xvi+448. (Berlin: R. Friedlander und Sohn, 1913.) Price 16 marks.