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.