

siderable improvement has been made in the character of the smelting appliances. Some curious points are, however, brought out by M. Guyard's researches, especially as regards the speiss or arsenical regulus formed in the lead furnaces, which he finds collect by preference nickel and molybdenum from the ores, while cobalt, if present, is carried off by the lead, and may be found in the skimmings taken from the bath before casting it into pigs. Another point of interest is the occurrence of chlorine, bromine, and iodine in notable quantities in the furnace fume, which are due to the corresponding silver salts of the ores. The general chemical problems arising in the study of the ores and the containing rocks have been treated in a separate section by Mr. W. F. Hillebrand. The mass of analytical material contained in these sections is very large and important, but in some instances their value is diminished by an unnecessary striving after accuracy. Analyses reported to six decimal places seem to be scarcely suitable for practical purposes. The petrography of the district has been studied by Mr. Whitman Cross, his results being illustrated by heliotype prints of microscopic sections which though good in their way are decidedly inferior to the excellent drawings given by Prof. Irving and others in the earlier volumes of the same series before photographic illustrations were used. In his preface Mr. Emmons very handsomely acknowledges the "continuous and unwearied service" rendered by Mr. Ernest Jacob, an old student of the Royal School of Mines, who, we are sorry to say, has been compelled by reasons of health to retire from a service in which in a comparatively short time he was able to do a large amount of excellent work.

H. B.

#### OUR BOOK SHELF.

*Practical Inorganic Chemistry: the Detection and Properties of some of the more Important Organic Compounds.* By Samuel Rideal, D.Sc. (Lond.), F.I.C., F.C.S., F.G.S., Fellow of University College, London. (London: H. K. Lewis, 1889.)

THIS little book, as we learn from the preface, is designed to meet the wants of the medical student in his higher examinations, and we may say at once that it fulfils that purpose admirably. The syllabus of the University of London has been duly considered; all the substances therein mentioned are discussed at length, and their reactions fully given: and not only this, but Dr. Rideal has helpfully distinguished in each case the most characteristic reaction by an asterisk. With the aid of this book, and with ordinary application, the average candidate may fearlessly confront the Sphinx of Burlington Gardens (and *a fortiori* all minor Sphinxes), and attempt her riddles without risk of being torn in pieces.

All this is excellently done, and only one regret crosses the mind of the reviewer. Of course, a medical student is not intended to be an organic chemist, or, necessarily, a specialist of any kind; and it would be absurd to expect from him the knowledge of a specialist. But the training of a medical student is calculated to make him regard himself as the depositary of universal scientific knowledge—a belief which he frequently carries with him through life. Would it not be possible to convey the salutary notion that all this testing for organic substances has about as much relation to real practical organic chemistry as, say, the "use of the globes" to practical navigation?

*Scottish Moors and Indian Jungles.* By Captain J. T. Newall. (London; Hurst and Blackett, 1889.)

MANY years ago, in India, Captain Newall was unfortunate enough to suffer from an accident by which the spine was fractured. To some extent he recovered his health, but he has never since been able to walk or even to stand. Yet he has contrived—by an ingenious device which enables him to be carried about in a chair, in an easy position, by several men—to obtain a good deal of wholesome exercise in the open air. In the year 1880, in conjunction with his brother, he took the little shooting of Scaliscro, in Lewis; and in the first part of this volume he describes the incidents of sport and out-door life there during the seasons of the following four years. The second part of the volume is devoted to a record of more or less exciting sporting experiences in India at a time when the writer had full use of his limbs. The book may be read with pleasure not only by sportsmen but by others, for it is written in a bright and attractive style, and Captain Newall is always careful to give as vivid a picture as possible of the surroundings in the midst of which the incidents of his narrative took place. His account of autumn life in Lewis is particularly fresh and interesting. There are twelve very good illustrations from sketches by the author.

#### 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.]

#### The Inheritance of Acquired Characters.

WILL you allow me to say, in reference to Prof. Hartog's interesting letter, that there is no ground for regarding the word "Lamarckism" as a nick-name? There can be no desire to "nick" him or anyone else, should it appear that the views they advocate are to be classified with those of Lamarck. Lamarckism is as reputable a denomination as Darwinism, and no reasonable man can possibly regard with anything but respect and sympathy the attempt to bring forward solid evidence in support of Lamarck's fundamental assumption, viz. that acquired characters are transmitted by heredity.

It is not unusual for children to rest the head on the left forearm or hand when writing, and I doubt whether much value can be attached to the case described by Prof. Hartog. The kind of observation which his letter suggests is, however, likely to lead to results either for or against the hypothesis of transmission of acquired characters. An old friend of mine lost his right arm when a school-boy, and has ever since written with his left. He has a large family and grandchildren, but I have not heard of any of them showing a disposition to left-handedness.

E. RAY LANKESTER.

45 Grove End Road, N.W.

It would be difficult to overrate the importance of the instance given by my friend Prof. Hartog in the last number of NATURE (p. 462) of the inheritance of a character acquired by habit; but the explanation which he offers of the non-inheritance of characters produced by mutilation, so far from being flat Lamarckism, appears to me to flavour of ultra-Darwinism, and the following hypothesis, resting more directly on mechanical principles, might be suggested. It is well known that many of the lower animals possess a remarkable power of regenerating lost parts. The garden snail offers a familiar instance: if the eyes be snipped off from their tentacles, they are in a short time reproduced, usually with a structure as perfect as that of their predecessors, as may be proved by a histological examination of thin slices. This power appears to be possessed to an unlimited extent, for one of my former pupils, Mr. Trevor Evans, performed the experiment twenty times in succession on the same snail, and the last eye was as perfect as the first; he then relinquished the research, being persuaded that the power of regeneration would

only terminate with the life of the unfortunate subject. This power of growing afresh so complex and specialized an organ as an eye is certainly at first sight not a little astonishing, but it appears to be capable of a very simple explanation: the cells terminating the cut stump of the tentacle are the ancestors of those which were removed; a fresh series of descendants are derived from them, similarly related to the ancestral cells as their predecessors which they replace; the first generation of descendants become in turn ancestors to a second generation, similarly related to them as were the second tier of extirpated cells; and this process of descent being repeated, the completed organ will at length be rebuilt. The possibility of this arises from the fact that in the snail the embryological course of development is capable of being repeated by the adult structure. In higher organisms this possibility does not as a rule exist, and mutilation is not followed by regeneration; but even in their case the ancestral cells remain, and when the embryological development is repeated their representatives in the embryo are present to give rise to descendants of the normal type in the normal fashion. It follows from this view, which leaves pangenesis out of account, that mutilations cannot possibly be inherited, and this for the reason that the cells forming the organism at each stage of its development must be regarded as the ancestors of those of the next stage; thus finally we are brought round to something which looks very like Weismannism.

W. J. SOLLAS.

Trinity College, Dublin, March 15.

P. S.—The foregoing completely accounts for the non-inheritance so often referred to of the character produced by circumcision. In the case of a snail it might be presumed that circumcision could not produce any persistent result; in the human subject what is remarkable is not the reappearance of the prepuce in the descendant, but that no regrowth beyond healing takes place in the subject.

MR. MARCUS M. HARTOG'S letter of March 6 inserted in last week's number (p. 462), is a very valuable contribution to the growing evidence that acquired characters may be inherited. I have long held the view that such is often the case, and that I have myself observed several instances of the, at least I may say, apparent fact.

Many years ago there was a very fine male of the *Capra megaceros* in the gardens of the Zoological Society. To restrain this animal from jumping over the fence of the inclosure in which he was confined, a long and heavy chain was attached to a collar round his neck. He was constantly in the habit of taking this chain up by his horns and moving it from one side to another over his back; in doing this he threw his head very much back, his horns being placed in a line with the back: the habit had become quite chronic with him, and was very tiresome to look at. I was very much astonished to observe that his offspring inherited the habit; and although it was not necessary to attach a chain to their necks, I have often seen a young male throwing his horns over his back and shifting from side to side an imaginary chain. The action was exactly the same as that of his ancestor. The case of the kid of this goat appears to me to be parallel to that of child and parent given by Mr. Hartog. I think at the time I made this observation I informed the late Mr. Darwin of the fact by letter, and he did not accuse me of "flat Lamarckism."

J. JENNER-WEIR.

Chirbury, Beckenham, Kent, March 16.

#### Hertz's Equations in the Field of a Rectilinear Vibrator.

IN Dr. Oliver Lodge's valuable communication to NATURE of the 21st ult. (p. 402), giving Hertz's equations for the field of a rectilinear vibrator, may I suggest the following very slight change, in order to bring the formulæ into complete accord with those of the Maxwellian theory.

Hertz has, with  $A^2 = \mu K$ ,

$$A \frac{dL}{dt} = \frac{dZ}{dy} - \frac{dY}{dz}, \quad A \frac{dM}{dt} = \frac{dX}{dz} - \frac{dZ}{dx}, \quad A \frac{dN}{dt} = \frac{dY}{dx} - \frac{dX}{dy},$$

$$A \frac{dX}{dt} = \frac{dM}{dz} - \frac{dN}{dy}, \text{ \&c.,}$$

whence he obtains the suitable solutions—

$$X = -\frac{d^2\Pi}{dx dz}, \quad Y = -\frac{d^2\Pi}{dy dz}, \quad Z = \nabla^2\Pi - \frac{d^2\Pi}{dz^2},$$

$$L = A \frac{d^2\Pi}{dy dt}, \quad M = -A \frac{d^2\Pi}{dz dt}, \quad N = 0,$$

where  $\Pi$  satisfies the equation—

$$\nabla^2\Pi = A^2 \frac{d^2\Pi}{dt^2}.$$

The corresponding Maxwellian equations would be—

$$\frac{dL}{dt} = \frac{dZ}{dy} - \frac{dY}{dz}, \quad \frac{dM}{dt} = \frac{dX}{dz} - \frac{dZ}{dx}, \quad \frac{dN}{dt} = \frac{dY}{dx} - \frac{dX}{dy},$$

$$A^2 \frac{dX}{dt} = \frac{dM}{dz} - \frac{dN}{dy}, \text{ \&c.,}$$

with the solutions, X, Y, Z, as before, and

$$L = A^2 \frac{d^2\Pi}{dy dt}, \quad M = -A^2 \frac{d^2\Pi}{dz dt}, \quad N = 0.$$

The more general solutions of the field equations would be—

$$X = \frac{d}{dy} \left( \mu \frac{d}{dx} - \lambda \frac{d}{dy} \right) \Pi + \frac{d}{dz} \left( \nu \frac{d}{dx} - \lambda \frac{d}{dz} \right) \Pi;$$

$$L = A^2 \frac{d}{dt} \left( \nu \frac{d}{dy} - \mu \frac{d}{dz} \right) \Pi;$$

with corresponding expressions, *mutatis mutandis*, for Y, Z, M, N; where  $\lambda, \mu, \nu$ , are arbitrary constants, coinciding with Hertz's results when  $\lambda = 0, \mu = 0, \nu = -1$ .

H. W. WATSON.

#### Alternative Path Leyden Jar Experiments.

IN your issue of Feb. 14 (p. 380) there is an "Electrical Note" which is very misleading. You will perhaps allow me to say, therefore, that Mr. Acheson's photographs show no evidence of oscillation whatever; that his experiments are aimed at practical questions connected with lightning protectors, and confessedly were not made in such a way as to have much theoretical importance; that Mr. Acheson is not expounding a new theory by calling self-induction "extra currents"; and finally, that the author of the note, in speaking about "the errors due to charging which vitiated Prof. Lodge's early experiments," is talking about something which has no existence.

OLIVER J. LODGE.

#### The Celluloid Slide-Rule.

CELLULOID has been applied to so many purposes, that one is never surprised to see one or other of its many valuable properties turned to account in some new way. A slide-rule is now made, in which the surfaces on which the divisions are engraved consist of thin sheets or veneers of dead white celluloid. The divisions are beautifully sharp and distinct. If these veneers do not come unfastened, and the rule does not lose its dead white surface with use and exposure, this new application of celluloid will be found a most valuable one. The rule examined is one almost identical in pattern with the well-known Gravet instrument, and, if one may judge by the scale, the accuracy of the divisions, and the smoothness of the motions, it is made by the same machinery. The differences are mere differences of detail. Mahogany takes the place of boxwood. The cursor runs on an improved form of slide. Chisel-edges, instead of cross-lines, on the cursor are used to transfer readings. There is only one opening at the back, so tangents cannot be read without reversing the slide. The millimetre scales at the two edges are replaced by scales of inches. It is a pity that one of the scales of millimetres has not been left. The agents are John Davis and Son, of Derby and 118 Newgate Street, and the price is rather less than that at which the ordinary Gravet can be obtained in this country.

C. V. BOYS.

#### The Philosophical Transactions.

YOUR correspondent "S." seems to be unaware that what he asks for has been already done. The abridgment of the Philosophical Transactions, which was brought down to the year 1800 by Charles Hutton, George Shaw, and Richard Pearson, was continued in octavo form, by order of the President and Council of the Royal Society, under the title of "Abstracts of the Papers printed in the Philosophical Transactions of the Royal Society of London." This series extended to six volumes, bringing the abridgment down to the year 1854. At the seventh volume the title was changed to "Proceedings of the Royal Society of London," a publication which still exists, and which contains abstracts of all the papers in the Philosophical Transactions and a good deal besides.

H. R.