well-selected points of view, and admirably reproduced as small quarto plates. These plates are striking illustrations of what can be accomplished by instantaneous photography as an aid to vulcanological study. Among them are very instructive views of explosive outbursts from the craters of Stromboli and Vulcano. In the case of the small explosions from the first-mentioned volcano, the ejected fragments are seen in the midst of the steam-clouds; and in the case of the more violent eruptions from Vulcano several phases in the same outburst have been caught at intervals of a few seconds. Those who already know this very interesting district will be glad to have their recollections revived by these admirable plates; and those who have never had the pleasure of visiting the South Italian volcanoes may obtain from these remarkable photographs a much better idea of the localities than any descriptions or drawings can possibly give.

Buried Cities and Bible Countries. By George St. Clair, F.G.S. (London: Kegan Paul, Trench, Trübner, and Co., 1891.)

EVERYONE knows that recent archæological research has brought to light a vast number of facts which are directly or indirectly connected with ancient Hebrew history. The object of the author of the present work is to set forth the more important of these facts, and to explain their significance. He deals with the results of exploration in Egypt, Palestine, and Mesopotamia; and he has a chapter on Jerusalem, with regard to the topography of which he has been led to conclusions different from those of other writers. The book has been prepared for the benefit of persons "who have no time to follow the course of exploration, and no taste for technical details"; and readers of this class will find in it much that will be to them both new and interesting. The value of the text is increased by good maps, plans, and other illustrations.

Food, Physiology, &c. By William Durham, F.R.S.E. (London and Edinburgh: A. and C. Black, 1891.)

THIS is the third volume of a series by Mr. Durham, entitled "Science in Plain Language." The author does not pretend to say anything new, but he has brought together, and arranged clearly, a mass of facts which will no doubt be of interest, and may be of practical service, to many readers who have neither time nor inclination for the study of more elaborate treatises. He begins with the consideration of solid and liquid foods, then gives some account of the constituents of food, and finally sketches the structure and functions of the bodily organs.

Blackie's Science Readers. (London: Blackie and Son, 1891.)

THE aim of this series is to arouse the interest of children in the common objects of the natural world, and to give them some insight into the processes by which articles of ordinary use are produced. The idea is excellent, and has been very successfully worked out. The series consists of five little volumes, the first two of which present some "lessons on common objects." From the third volume the reader will learn something about the simple principles of classification; about substances used in arts and manufactures; about phenomena of earth and atmosphere; and about matter in three states—solids, liquids, and gases. The fourth and fifth volumes—by the Rev. Theodore Wood—deal with animal and plant life. The facts set forth have been carefully selected, and they are presented in a bright, easy, natural style which cannot fail to make them at once intelligible and attractive. Good teachers will find the series of real service in helping them to foster in the minds of their pupils a love of accurate observation and independent reasoning.

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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.]

Comparative Palatability.

WITH the view of supplementing the experiments carried out last year by Mr. F. Finn and myself (NATURE, vol. xlii. pp. 571, 572), I have been feeding, during August and September, specimens of the common frog and toad.

Among Hymenoptera, *Bombi* are readily taken by frogs. I have records of *B. lapidarius* (drones and workers), *terrestris* (queens and workers), and *muscorum* (drones and workers). On one occasion only a freely-feeding frog refused to attack for the second time a large queen of *terrestris*, which had stung its mouth. Many of the insects were, however, thus taken at the second attempt. The common wasp was eaten eagerly by frogs and toads. I was again unfortunate in not taking any *Chrysididae*. *Sirex gigas* was attacked both by a frog, for which it seemed too large, and by a toad, under whose lip it appeared to insert its ovipositor. Neither animal ventured to seize it again—certainly for an hour or so. I was then obliged to abandon the observation. I could get no large ichneumons.

Of Lepidoptera, *Vanessa urticae* was taken by frogs and toads, and *V. io* by a frog. Three or four specimens of *Pieris rapæ* and *napi* would be taken in succession by a frog, which also ate *P. brassicae*. The insects' flutterings did not seem to matter: more than once they were taken on the wing. A toad once took *P. rapæ*. I was surprised to see a frog seize a dead specimen of this butterfly, which had been lying for several hours in the inclosure. It was partially swallowed, but rejected after some seconds—having unfortunately been taken together with some cedar needles. *Plusia gamma* was eaten eagerly by both frogs and toads. Hairy caterpillars (e.g. of *Orgyia antiqua* and *Spilosoma* sp.) were taken by a frog. Smooth green larvæ were eaten greedily.

Of Diptera, *Eristalis tenax* was eagerly seized by frogs and toads. A red-tailed, long-winged fly was eaten by a frog.

Blatta orientalis was taken without hesitation; as were, of course, earthworms.

Of three frogs under observation, only one was of much working value. This specimen (a male) became in a fortnight so tame as to attempt to take the handle of the butterfly net with which I placed the insects, &c., in the inclosure. This fact recalls Mr. E. B. Poulton's observation, that his tree-frogs seized the end of the forceps with which food was given them.

It is, perhaps, worthy of notice that the larvæ of the blow-fly, though eaten eagerly by toads, are frequently passed whole from the body; and would, therefore, seem to be with difficulty digested.

Want of time has prevented my experimenting, as I had wished to do, with *Salamandra maculosa*. Mr. F. Finn offered a specimen to ducks, which will eat the small newt, and found that though more than one bird observed it, and one even ran towards it, it was not touched. The observation extended over more than an hour.

E. B. TITCHENER.

Mote House, Mote Road, Maidstone, September 25.

Alum Solution.

DANS le no. 1141 de votre excellente Revue, M. Napier Draper demande pour quelle raison la solution d'alun a été universellement adoptée pour l'absorption des radiations de grande longueur d'onde. Ce n'est point pour répondre à cette question que je vous écris, car, pas plus que votre correspondant, je ne connais d'expériences directes suffisamment exactes desquelles il résulterait que la solution d'alun absorbe plus que l'eau pure. Je hasarderai, cependant, une explication: l'eau est un des liquides transparents les plus absorbants; l'alun occupe un rang analogue parmi les solides; en dehors de toute vérification, si l'absorption sélective de chacun de ces corps s'exerce sur une partie différente du spectre, on peut supposer que leur mélange exerce une absorption plus complète que chacun des corps pris isolément.

A cette occasion, je prendrai la liberté de relever une erreur que l'on a fréquemment commise dans ces derniers temps au sujet de l'absorption des radiations infra-rouges par l'eau. On a

coutume de définir le rendement d'un foyer de lumière par le rapport de l'énergie située dans la partie visible du spectre à l'énergie totale rayonnée par le foyer. Sans insister sur ce que cette définition a de défectueux (je traiterai prochainement cette question dans la *Revue générale des Sciences*), je rappellerai qu'on mesure d'ordinaire le rendement en recevant successivement sur un radiomètre quelconque (pile de Melloni, bolomètre, radiomètre de Boys) la radiation totale du foyer, et la radiation qui a traversé une certaine épaisseur d'eau; on admet que les radiations obscures ont été retenues, et on fait le quotient de ces deux quantités. Aucun physicien, je suppose, ne croit que l'absorption par l'eau commence à l'endroit précis où cesse la vision, et devient immédiatement totale, mais on pense en général que le résultat ainsi obtenu est assez approché.

Or nous pouvons déterminer directement le rendement photographique d'une source en mesurant la superficie des courbes d'énergie rayonnante visible et invisible. En partant des nombres de M. Langley, on trouve ainsi, pour le rendement d'une lampe à gaz une valeur comprise entre 1 et 2 pour cent. D'autre part, les recherches de M. Knut Ångström ont montré que l'absorption par l'eau est presque nulle pour $\lambda = 1\mu$, et n'est totale qu'à partir de $\lambda = 2\mu$ environ. Une couche épaisse d'eau laisse passer près de 10 pour cent de l'énergie rayonnante invisible. La méthode ordinaire donnerait donc, pour le rendement d'une lampe à gaz, 11 à 12 pour cent, c'est à dire une quantité six fois trop forte.

Je ne quitterai pas ce sujet sans faire remarquer le singulier usage en vertu duquel la puissance de la radiation solaire est rapportée à la minute, tandis que toutes les puissances possibles—cheval, horse-power, watt, ainsi que toutes les radiations—sont exprimées par rapport à la seconde. Il serait temps de faire disparaître cette anomalie.

CH. ED. GUILLAUME.

Pavillon de Breteuil, Sèvres, France,
25 septembre, 1891.

Weather Cycles.

WITH reference to this most interesting question, may I be allowed to call attention to the following figures? Having had to consult Dr. Rutty's "Natural History of Dublin," 1772, vol. ii., I casually found on p. 353 of that volume, in his remarkable detailed registry of the weather in Dublin for a long series of years, the following remark: "It has been remarked that the following years were memorable for great frosts in England, viz. 1638, 1661, 1684, 1708, 1716, 1739." Now the intervals between these dates are 23, 23, 24, 8, 23. He further remarks, on p. 368:—"It is to be observed that whereas since the great frost of 1739, until the latter end of the present summer, 1744, we had generally an unusual prevalence of dry weather, in autumn our usual wet weather returned." It may be remarked that the interval of 23 years is about double the sun-spot period, and furthermore that the years mentioned by Rutty correspond roughly with years of sun-spot minima or maxima as given in Wolf's Catalogue, mentioned by Guillemin in his work "Le Ciel" (1877), p. 104. This correspondence would appear as follows:—

Sun-spot Year.	Interval.	Great colds.	Interval.
1639·5 min.		1638	
1660 min.	20·5	1661	23
1685 min.	25	1684	23
1705·5 min.	20·5	1708	24
1718 min.	12·5	1716	8
1738·7 min.	20·7	1739	23
1755·5 max.	16·8		15
	6·0	1754	8
1761·5 max.		1762	

J. P. O'REILLY.

Royal College of Science for Ireland, Stephen's Green,
Dublin, September 25.

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Occurrence of the Ringed Snake in the Sea.

THE readiness with which the British snake (*Tropidonotus natrix*) will enter fresh water is well known. Its occurrence in the sea seems anomalous, and therefore I venture to submit the following details.

The specimen in question was seen on September 7, from a small boat on the east coast of the Isle of Wight, while about a thousand yards distant from the shore, and about midway between Shanklin and Luccombe Chines. When first seen it was swimming straight out to sea—viz. in an easterly direction. The sea was calm and a strong current was flowing from the south, so that the creature was swimming across the current. At first it took no notice of the boat, but as the boat was rowed towards it, it changed its course and swam directly away from the boat. It was soon captured, and found to be uninjured and in good condition. Upon dissection it proved to be a male; the entire alimentary canal was absolutely empty. The internal organs were free from disease or other abnormality. It measured 33 inches in length. It is most probable that this snake entered the sea about a mile from where it was obtained, as the beach is bounded by almost perpendicular cliffs, some 300 feet high, at that place.

J. COWPER.

A Rare Phenomenon.

MR. WILSON's letter in your issue of September 24 (p. 494), recalls what I myself saw on the same evening. On Friday, the 11th, I was returning with a friend to town after a day's ramble in Epping Forest. We caught the 8.36 p.m. train at Epping, which is due at Woodford at 8.59, and was, I think, only a few minutes late. Just as the train was nearing Woodford Station, my friend and myself simultaneously noticed a luminous band, such as that observed by Mr. Wilson, and extending from the horizon almost to the zenith. Our first unreflecting thought was to refer it to the revolving light at the Naval Exhibition, only it did not revolve, and the direction was quite wrong. The fact that both of us thought of this is indicative of the appearance which the luminous beam bore. The night was clear and starlit, and I observed that the point in the horizon from which the beam rose was almost under the Great Bear, but a little to the left as I faced it. We saw it only for a minute or two before it was hidden from us by the shed of Woodford Station, in which station we stayed for what seemed a long while. When we got into the open country again, the phenomenon had disappeared. I may add, that my own eye being unfortunately defective for red, I asked my companion if he noticed any red tinge in the light, and he answered that it seemed quite white.

Burlington House.

HERBERT RIX.

THE narrow luminous band described in NATURE, September 24 (p. 494) was seen here on Friday, the 11th inst., between 8.30 and 9 p.m., at the same time at which it was seen by Mr. Wilson in the county Westmeath, but about twenty-two hours later than it was seen by Prof. Copeland in Aberdeenshire. It passed close south of Cassiopeia, and nearly through the zenith. Half an hour later it had drifted 8° or 10° southward, and had become very faint.

There can be little doubt that the very rapidly moving "comet" seen by Mr. Eddie at Grahamstown, South Africa, on October 27, 1890, was a phenomenon of this kind.

J. L. E. DREYER.

The Observatory, Armagh, September 28.

The Heights of Auroras.

THE rare part of the phenomena described by your correspondents is the extreme narrowness of the auroral arches seen on the 10th in the north of Scotland, and on the 11th at Ryde. I take all the other descriptions on the 11th to refer to one arch—a different one from that seen at Ryde; and it was a much wider one, and therefore less unusual, its width having been about 5° as seen here. Your correspondents do not give its width, except that, as seen from Nottingham, it was evidently very broad, and is not stated to have been an arch at all, though I should suppose it was one. The observation at Nottingham Forest, compared with those further north, gives a good opportunity for ascertaining the height of the top of the aurora; but, as Mr. A. Marshall has not given the altitude of the base of the aurora as seen from Nottingham, there are no materials for cal-