

only capable of increasing the proportion of water in the crop; if nitrogenous manures are found in any case to be of little value, it is not because the plant does not require nitrogen, but simply because the soil supplies an abundance without the aid of manure. Concerning the richness of the experimental soils in nitrogen nothing is said. Mr. Jamieson, the chemist of the Association, has, however, stated in another publication that the Aberdeenshire soils usually contain 0.4 per cent. of nitrogen. If this is the case, there is little reason to wonder at the small effect of nitrogenous manures. The amount of nitrogen just named is far in excess of that usually found in arable soils, and about equal to what we should expect to find in the soil of a well-manured kitchen garden.

The percentage of water in a plant is always increased by anything which increases its luxuriance: a big turnip is sure to contain a greater proportion of water than a little one. If, therefore, we are to condemn manures simply because they increase the percentage of water, we may as well stop manuring altogether. It is quite right, however, that the percentage of water in the produce should be taken into account in comparing the effect of different manures, as it is clear that only the dry matter of the crop can have any feeding value.

The experiments, as before, exhibit a vast amount of painstaking work, and cannot fail, if continued in the same spirit, to be of service to the farmers of Aberdeen.

A History of British Freshwater Fishes. By the Rev. W. Houghton, M.A., F.L.S., Rector of Preston-on-the-Weald Moors, Wellington, Shropshire. Two volumes, extra large 4to. (Copies to be obtained from the author at the above address.)

THE most complete monograph on this branch of natural history which has yet appeared, several species of *Salmonidae* being illustrated for the first time. The coloured figures and the engraved lake and river scenes, which head each chapter, are admirable works of art. The book is exquisitely got up, and is well suited to the drawing room table. At the same time, it is of real scientific value to the amateur ichthyologist, the descriptions and plates rendering the species of easy identification. The preliminary chapters on the classification and anatomy of fishes are carefully written and well illustrated. The work will add to Mr. Houghton's reputation as an intelligent and accomplished naturalist. C. C.

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. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Price of the "Memoirs of the Geological Survey"

THE publication of Mr. Skertchley's "Manufacture of Gun Flints," in the Memoirs of the Geological Survey, seems to be a good opportunity for again bringing under notice the absurd price charged for some of the Survey volumes. In NATURE, vol. xviii. p. 562, Prof. Boyd Dawkins drew attention to this subject, and urged the necessity of issuing the "Memoirs" at a reasonable price; but this last publication shows that the Stationery Office does not intend to mend its ways, but will still try and put the information it issues as far as possible out of the reach of the public. The fact I should like to draw attention to as regards the price of the "Memoirs" is the absurdity of the amount charged for some of the volumes, as proved by others issued by the Survey; and a glance at the facts seems to show that the prices are fixed without any regard to the size or quality of the book. Mr. Skertchley's pamphlet consists of 80 pp. and 71 figs., and this, in a paper wrapper, is priced 17s. 6d.! Now, take Prof. Judd's "Geology of Rutland," this contains 320 pp.

(or exactly four times as many as Mr. Skertchley's) 11 plates and 19 woodcuts, and the price of this, in cloth, is 12s. 6d., or 5s. less than the one of 80 pp. Another example is Mr. De Rance's Memoir on the "Superficial Geology of the Coasts of South-west Lancashire," which consists of 139 pp., and 20 woodcuts, and for which we have to pay 17s.; compare with this Mr. Woodward's "East Somerset and Bristol Coalfield," containing 271 pp., 9 plates, and 23 woodcuts, which is only one shilling more than the last-named, and is issued in cloth. But perhaps the most curious two to take together are Mr. Skertchley's volume on the "Fenland," and Prof. Green's "Report on the Yorkshire Coalfield." The former of these contains 335 pp., 24 plates, and 36 woodcuts, and is published at 2l., the latter has 823 pp., 26 plates, and 125 woodcuts, and yet the price is only 2l. 2s. It is certainly hard to understand why we should be charged 2l. for Mr. Skertchley's volume, if one the size of Prof. Green's can be produced for 2l. 2s. One would imagine that books issued with the public money would be sold as cheaply as possible; and it is to be hoped that some friend to Science in Parliament will ask a question of the Government, and see if it is absolutely necessary that these Memoirs should be published at such famine prices.

Oxford

JAS. B. BAILEY

The Sea-Serpent

IN NATURE, vol. xix. p. 286, I observed some remarks respecting sea-serpents, and especially noted one passage which stated that "The age of incredulity is past, and naturalists are now prepared to admit that several distinct kinds of oceanic monsters probably exist."

I was pleased to read this statement, as I have for many years been convinced that some of the accounts published from time to time in the newspapers are accurate descriptions of what has actually been witnessed, but I little expected that I should so soon be able to forward to you a description of one of these creatures, as given by an eye-witness, of whose accuracy there can be no question, and whose observations were made when very close to the animal.

Busselton is a little seaport about 150 miles south of Fremantle, on the west coast of Australia, situated on the shore of Geographe Bay, which is sheltered by Cape Naturaliste; the northern point of that singular projection on the south-west corner of Australia.

During the greater part of the year the water of Geographe Bay is as smooth as a lake, though it is a portion of that vast Indian Ocean which extends unbrokenly to the African coast. The beach is of smooth white sand, so hard at the water's edge that it is frequently used as a road for riding or driving from Busselton to Lockville; the latter place, a few miles to the north, is the station of the Ballarat Timber Company, containing their steam saw-mills, the termination of their railway, and the jetty from which large quantities of that imperishable and valuable timber called jarrah is exported to be used as piles, railway sleepers, &c.

Last month I heard a report that the sea-serpent had been seen near Busselton, and that the resident clergyman had been one of the spectators. Having the pleasure of personal acquaintance with that gentleman, I wrote to him on the subject, and received from him such an interesting account, that I applied to him for permission to communicate the facts to your paper, and verify them by publishing his name. It is fortunate that the principal eye-witness was an educated gentleman, who has for twenty-seven years been a Colonial chaplain in this colony, and whose description of what he saw is clear, simple, and free from exaggeration.

I copy from the letters of the Rev. H. W. Brown the following extracts:—

"On Sunday, March 30, I left Lockville just as the sun was setting, on my way home by the beach.

"The afternoon had been oppressively hot, not a breath of wind, and the sea was as smooth as a glass. I met C. McGuire and his wife walking towards Lockville.

"Soon afterwards, when abreast of the track to Richardson's, I noticed ahead of me what looked like a black log of wood in the water a stone's throw from the shore, nearly end-on to me, and apparently more buoyant at that end; getting nearer, I noticed that it was *drifting* apparently towards Lockville, and soon discovered that it was moving, leaving behind it a very long, narrow ridge on the smooth water. I then turned my horse's head, and, at a walking pace, kept just abreast of it, un-

noticed apparently, till I had gained sufficiently on M'Guire to make him hear. I then coo-*eed once*; he turned and came back to meet me; but at the sound of my coo-*ee* the fish started off seawards out of sight (under water), and doubled again in-shore, but so rapidly as to leave both outward and inward "ridge" on the water distinctly visible at once, like a wide V with quite a sharp corner. It gave me the idea of two fishes, the one darting outwards, the other crossing its track inward at the same moment.

"Not knowing where it might show up next, but satisfied that it had come in-shore again, I tried by pointing seaward to direct M'Guire's attention that way.

"Just as I met him the fish again came to the surface, showing gradually more and more of his length, till, when he was almost at rest, and all apparently was in view, I estimated the length to be 60 feet, straight and taper, like a long spar, with the butt-end, his head and shoulders, showing well above the surface.

"I can only describe the head as like the end of a log, bluff, about two feet diameter; on the back we noticed, showing very distinctly above water, several square-topped fins."

I here make an exact tracing from Mr. Brown's letter of his sketch:—



"It was now getting rather too dark to see details distinctly. The fish proceeded towards Lockville, and I turned homeward. M'Guire said he would go on to Lockville jetty and look out for him there.

"Whether he saw him again I know not, but M'Mullan, the fisherman, told me next morning that he had seen it about fifty yards from that jetty, and it looked to him about twenty feet long. So it did to me while in motion; only when at rest for a moment did its whole length show up sufficiently. What its propelling power was I cannot say from observation; I saw no lateral fins and no fish-tail.

"When it started away at the sound of my voice, it was with the rapid movement of a pike or sword-fish, and yet the thick, bluff head had but little resemblance to a snake's.

"There was an unusual abundance of fish close in-shore the same afternoon, yet when I saw the stranger there were certainly no fish of which it could be in pursuit."

Since the year 1848, when the captain and officers of a British man-of-war gave evidence that they passed within 100 yards of a snake which they estimated to be 60 feet in length above water with probably 40 feet beneath, I do not know of any more clear account than the above. Many independent accounts of the existence of marine monsters have been placed on record, and it seems mere folly to treat these repeated reports with ridicule.

I trust that your readers will no longer doubt that "the age of incredulity" is past.

Fremantle, W. Australia, May 19

H. C. BARNETT,
Colonial Surgeon

Mechanical Difficulty in Growth of Plants and Animals

In reading reports and discussions on natural science, to which I am, from great pressure of other occupation and studies, only able to give a cursory attention, I cannot find any allusion to the *mechanical* means by which the growth of organised creatures is produced, especially when that growth takes place in opposition to the direction of gravitation. The explanation at which I have arrived of this phenomenon may probably be known to physiologists, and may have been acknowledged or disproved; any way I think the subject might be fairly discussed in a popular journal such as yours.

The growth of the roots of a plant and of drooping branches not being in opposition to the attraction of the earth, presents only the difficulties which arise from vital action, but the increase of a plant in height requires also explanation as to how the work is done of lifting vegetable matter higher and higher; capillary attraction can bring fluid to the summit of a tube such as the stem of a plant, but the fluid cannot overflow at the top, since in that case the matter of the tube would lift the fluid above itself; but when a tube is full of fluid, additional heat expanding this fluid would cause it to overflow at the top of the tube. As the sap contains solids in solution, from this the fluid could deposit an additional length of tubing, in which again an additional length of the column of fluid could be absorbed, so the heat of each day would build up a higher vertical tube, and capillary attraction would account for the cooler fluids produced at night

or rising from the root filling the vessels to their extremities. It seems to me, therefore, that the work done in lifting vegetable matter to the apex of a plant is due to the increase of heat in the daytime; that then the watery particles are evaporated, and the solid left deposited in the form of cylindrical vessels of small bore. In animals the prostrate posture of rest allows of growth without the difficulty of resisting gravitation; it is well known that deficiency of sleep (perhaps more accurately of rest) stunts the growth of animals, and that illnesses which keep children in bed during their years of growth almost always cause a rapid increase of stature; surely this arises from the newly-formed tissues having no gravitation to overcome, and therefore developing rapidly. Probably if a child were taught to take rest in a vertical position, it would not grow tall, but develop in breadth.

The work done in increasing the stature of plants every year must be enormous; in one summer thousands of tons of vegetable tissue must be raised through heights varying from a few inches in an oak, to twenty or thirty feet in a hopbine, and much more in a liano, or tropical creeper. I presume in winter the cold constricts the vessels, and so prevents sap from rising, hence there is no growth at that season.

Taunton College School

H. P. KNAPTON

Chemical Notation

IN Mr. Pattison Muir's very interesting article on thermo-chemical investigation (*NATURE*, vol. xx. p. 8, I find the following:—

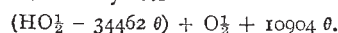
"That system of notation which is now employed in chemistry, although of the greatest value, is nevertheless far from being perfect; it fails to tell anything concerning the changes in forms of energy involved in those changes of distribution of mass (matter?) which it formulates."

The author does not, however, propose any addition to the usual notation for the purpose of indicating the transformations of energy which take place in chemical transformations, yet this may be done very simply.

The symbol for water is HO_2 . This states with perfect clearness the fact that a molecule of water has been formed by the combination of a molecule of hydrogen with a half molecule of oxygen, but it leaves out of account the important fact that in the act of their combination 34462 heat-units have been given out. If we call a heat-unit θ , the symbol for water will then be $\text{HO}_2 - 34462 \theta$; the negative sign indicating that the heat has been *parted with*. I propose to call such compounds thermo-negative. Products of perfect combustion, such as water and carbonic acid, are necessarily thermo-negative.

There are thermo-positive compounds, of which protoxide of nitrogen is one of the best understood. According to Fabre and Silbermann, 1154 heat-units are given out in the separation from protoxide of nitrogen of one gramme of oxygen. It is obvious that this heat must have been *taken up* in the formation of the protoxide. Multiplying 1154 by 8 for the equivalent of oxygen, we get 9232 as the thermal equivalent of the protoxide, and we write its symbol $\text{NO} + 9232 \theta$.

Peroxide of hydrogen is usually written HO , but this, from the point of view of chemical structure, is altogether wrong. Fabre and Silbermann "estimate the heat evolved during the liberation of one gramme of oxygen from peroxide of hydrogen at 1363 heat-units. Multiplying by 8 as before, we have 10904 as its thermal equivalent, regarding it as a thermo-positive oxide of water, and we write its symbol



JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim, July 8

Local Colour-Variation in Lizards

MR. HENRY HILLIER GIGLIOLI remarks (*NATURE*, vol. xix. p. 97) that the common lizard (*Podarcis muralis*) constantly presents dark varieties on islets adjoining small islands. A similar case has come under my observation in the herpetological fauna of this country. *Ameiva* (cnemidophorus) *vulgaris*, Licht., is very common all over Venezuela, and though it varies considerably in colour, it is, on the mainland, never black, as on the small islands of Los Roques and Orchila, which lie a short distance off our Caribbean coast. Both islands have rather extensive sandy beaches, covered with a very scanty vegetation, so that, *mutatis mutandis*, they are, in the very words Mr. Giglioli uses when speaking of Filifa, painfully white in the glaring