slightly different from most text-books of the subject, one being that a short account is given of the history of most of the physiological discoveries of importance, which is generally neglected in works of similar character, notwithstanding the additional interest which is thereby introduced. The other point is, that an account is given of the anatomical construction of the organs whose functions are to be studied, by which means those who have not, as medical students, gained the necessary amount of knowledge of anatomy to make clear their fundamental notions, can read on and understand without reference to other works.

In the preface Dr. Le Bon enters into a short account of the aims and objects of the study of physiology. He remarks that "it is with profound wisdom that the philosophy of the ancients epitomised what ought to be known by man, in the maxim, printed in golden letters on the doors of their temples, *Know thyself*." We cannot, however, in any way agree with this physical distortion of the proverb, and think that the endeavour to place physiology on such a footing will never lead to successful results. The subject is not taught in schools, and it is true that the youth during several years of his life has, instead, been a student of the past, in company with the heroes of Greece and Rome. "The time has arrived for him to make use of his knowledge. He enters the business of life. He has to instruct the masses, lead the multitude; yet, of the nature of men, of their instincts, of their passions, he is absolutely ignorant." Notwithstanding all this, we must differ from our author in assuming that a thorough knowledge of the human organisation is indispensable, or even useful, in supplying the deficiency indicated; and there are many, we think, who will agree with us. No better proof that such is the case can be adduced than the medical profession itself. Its members are all more or less acquainted with the most important physiological facts and theories; supplemented, which is much to the point, with a thorough anatomical knowledge. Nevertheless, it is not to the medical profession that we are accustomed to look for moral philosophers, politicians, or novelists, but rather for thorough scientific workers, and an overwhelming percentage of nonentities, as far as the world at large is concerned. Statistics as to the average length of life amongst medical men would hardly show any advantage in their favour, and as patients they are notably unmanageable. As an education, physiology is therefore, no doubt, as good as any other science, but its further value is a delusion and a snare. It has been our object, on several occasions, to ascertain the amount of information as to the mechanism of the organ and of the piano possessed by some of the most accomplished musicians, and in nearly every case we have found that they are perfectly ignorant of acoustics and the mechanical construction of the machinery they are employing. And yet is not *Know thy instrument* at first sight as applicable to the musician as *Know thyself* to humanity at large? How few of us could pick to pieces and reconstruct a clock or watch, and yet how many of us have never missed a train in our lives!

These remarks are not made in disparagement of physiology, but in opposition to the misleading argument adopted by several others as well as the author of the work before us, to the injury of science itself in the estimation of the public at large, because of the false expectations it raises.

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.]

Fossil Remains of the Fallow Deer found in Malta

REFERRING to Dr. Jeitteles' monograph on the Distribution of the Fallow Deer, translated by Mr. Selater (NATURE, vol. xi., p.

71), it may be interesting to record that fossil exuviae referable to *Cervus dama* were discovered in Malta within the last few years. From inquiries I learn that they were found in a rock fissure impacted amongst the red soil which usually fills all the numerous rock rents of the island, where also fossil elephants' remains have been met with. The exuviae in question were sent to the late Mr. W. Flower, F.G.S., and subsequently examined by Mr. Busk, Mr. Boyd Dawkins, and myself. They contain fragments of long bones and several entire feet bones and teeth, referable to small-sized adult individuals of the Fallow Deer. There is, besides, the molar of *Equus* and a canine referable to *Canis*, from the same situation.

The mineralogical aspects of the specimens are similar to those of the Quaternary fossil fauna of the island, but this is, as far as I can discern, the first instance of fossil remains of *Cervus* and *Equus* having been discovered in Malta or Gozo. Canine teeth of the same dimensions as the above, and referable to *Canis*, were found by Admiral Spratt and myself in conjunction with teeth and bones of *Hippopotamus pentlandi*, from the Malak Cavern of Malta.

Royal College of Science,
Dublin, Jan. 21

A. LEITH ADAMS

Electric Conductivity of Nerves

IN a recent number of NATURE (vol. x. p. 519) the reviewer of "The Protoplasmic Theory of Life" states broadly that few physiologists will agree with the statement in the book that the nerves are not better fitted for the conduction of electric currents than the other moist tissues, and that they possess no demonstrable apparatus for insulation of these currents. There must be some misunderstanding here, for I have adduced proofs from Dubois-Reymond, Ranke, Fick, and others, and I believe all physiologists of note concur in the view as represented by me. The reviewer has apparently overlooked the circumstance that one of the principal points in the chapter was the distinction of the conveyance by nerves of the stimulus caused by electricity, and the mere conduction of an electric current, for he says "there is not the least doubt that it is through the nerve-fibres that electric stimulation will most readily and most powerfully affect muscular fibres at a distance." No one, I imagine, does doubt this, but it is not at all the same thing as saying that the nerve is the best medium for affecting the muscle owing to its superior power of conducting electricity, for it may also mean that the nerve is susceptible to the stimulus of electricity. This is, indeed, sufficiently shown by the fact that a mechanical stimulation of the nerve will have a similar effect, while we do not attribute to the nerve any superior power of conducting mechanical force. Permit me to refer to the additional light thrown on the question in the recently published work of Prof. Vulpian ("Leçons sur d'Appareil Vaso-moteur," 1875). It had been asserted by Legros and Onimus, that on passing a galvanic current through a nerve containing vaso-motor filaments, the ascending current caused contraction, while the descending ones produced dilatation of the capillary arteries. The experiments of Vulpian and Carville yielded results not in accordance with this statement, and both currents were found to cause contraction. Vulpian explains this discrepancy by pointing out that Legros and Onimus assumed to act on particular nerves by sending the current through the skin and subjacent parts. "Not only," says Vulpian, "are we not authorised to believe that we act on these nerves by this mode, but, in addition, it is evident that we determine excitation of all the tissues comprehended in the current, the skin among others, and that that excitation may provoke reflex vascular dilatations which complicate the results" (p. 114). To perform the experiment properly, it is necessary to secure isolation artificially by cutting the channels of reflex vaso-motor action. Again, if you electrify the sciatic nerve in a dog which has been curarised, no contraction of the voluntary muscles to which it is distributed takes place. And in paralysis of the radial nerve in man from cold, the power of volition over the muscles supplied by it is lost, while the sensory and vaso-motor filaments bound up in the same nerve retain their functional activity. In those cases the power of conducting electricity is not impaired, nor is it indeed in the dead body even; but here, as expressed by Vulpian, "the musculo-motor filaments have lost their normal aptitude to cause the muscular bundles to pass from the state of repose to the state of activity" (p. 122). What that "normal aptitude" consists in is still a question, but it is certainly not the power of conducting electricity, although a knowledge of the latter is of great importance in judging of Dr. Beale's theory of muscular contraction,

Dr. Beale, as is well known, still holds to the opinion that the nerve-force is electricity, and that the nerves have not only the power of conducting electricity but of evolving it as a vital act on stimulation from the little masses of protoplasm, bioplasm, or living matter with which the nerve-cords are studded. Although there are many objections to this theory, still the badly-conducting power of the nerves for electricity does not appear an insuperable one when we think of the nerve-force merely as a stimulus, for the quantity of a stimulus necessary to rouse up vital action bears an infinitesimally small proportion to the result. But when the same force is assumed to be the efficient cause of muscular contraction, the question assumes a very different aspect. In Dr. Beale's theory the muscular fibre proper is held not to contain protoplasm, and to be incapable of living action or of evolving force, the contraction being produced by inductive electric action on the sarcous particles, which causes them to change their position and thus approximate the ends of the muscular fibre. The source of the electricity is said to be the protoplasm masses contained in the muscles, in continuous contact with the motor nerves, and it is conveyed to the muscular fibres by loops of fine nerve-fibres crossing them in various directions. In this theory, even supposing insulation to be complete, it is obvious that the conducting power of the nerve-fibre becomes of supreme importance, because not the stimulus only, but the whole force of muscular motion, must be conveyed by it. Now, the nerve-cords do conduct electricity certainly, but so many million times worse than metallic wires, that the loss of energy by transformation into heat must be enormous. Such a loss is inconsistent with the economy of nature and with the actual facts; therefore, unless the nerve-force is a specific force different from surface-electricity, galvanism, and magnetism, though analogous to them, and probably easily convertible into electricity, Dr. Beale's theory cannot be upheld. I have not yet seen any reply by Dr. Beale to this objection.

JOHN DRYSDALE

Liverpool

Kirkes' Physiology

In a letter headed "Kirkes' Physiology," in NATURE of last week, signed "W. Percy Ashe," your correspondent would not appear to be practically acquainted with the semi-lunar valves at the base of the great vessels emerging from the heart, for his arguments, although perfectly correct in themselves, and based on well-known physical laws, do not, I submit, apply in the instance he quotes, for the simple reason that the conditions necessary for their application do not exist.

Let us consider briefly the shape of the sinuses of Valsalva during the diastole of the ventricles of the heart. For our purpose we shall be sufficiently correct in describing them as three inverted, empty, and slightly truncated pyramids; one surface, the outer one, of each, is formed by the arterial coat, whilst the other two surfaces, constituting the semi-lunar valve, are in apposition with the corresponding surfaces of the other two valves. Now, the pressure over the whole surface of the sinus may be divided into four pressures, one sustained by each of the three sides, and one by the bottom.

The three sides sustain an equal pressure, but the two inner ones constituting the valve are by far the weakest, and the pressure on each of these is really supported by an equal pressure on the corresponding surfaces of the other two valves, and consequently may be considered as *nil*; whilst the pressure on the third side is resisted by its own strength, and it is formed, as I have said, by the wall of the artery, which is particularly strong at this point.

The remaining pressure is sustained by the bottom or truncated apex of the pyramidal pouch. This pressure is greater in proportion to its extent of surface than the other pressures—the column of fluid being higher—and this surface directly rests on and is *partially embedded* in the structure of the ventricle, which must thus undoubtedly support it.

Therefore the idea that "the reflux is most efficiently sustained by the muscular substance of the ventricle," which is the main part of Mr. Savory's theory, is most directly confirmed by the actual construction of the valves, and which your correspondent may see for himself by making a vertical section through the aortic valves in a sheep's heart.

As at the time of the greatest pressure on the valves the ventricles are dilating, it follows that they cannot reduce the area of the valves at that time, as your correspondent in his last remarks would seem to imagine, nor in fact can they ever do so.

4, Granville Place, Blackheath

E. PRIDEAUX

The Rhinoceros in New Guinea

LIEUT. SIDNEY SMITH, late of H.M.S. *Basilisk*, reports that while engaged in surveying on the north coast of Papua, between Huon Bay and Cape Basilisk, being on shore with a party cutting firewood, he observed in the forest the "droppings" (excrement) of a rhinoceros in more than one place, the bushes in the neighbourhood being also broken and trampled as if by a large animal. The presence of so large an animal belonging to the Asiatic fauna in Papua is an important fact.

Skins of a very fine species of Bird of Paradise, having plumes of a brilliant red in place of the yellow plumes of the common species (*P. apoda*), were obtained from the natives further to the eastward.

ALFRED O. WALKER

Chester, Jan. 21

[We should be inclined to doubt very seriously the occurrence of any rhinoceros in New Guinea. At any rate, the *important fact*, as our correspondent terms it, cannot be considered as established.

The red-plumed Paradise Bird of the south of New Guinea has been named by Mr. Sclater, *Paradisea raggiana* (P. Z. S., 1873, p. 559), from skins sent home by Mr. D'Albertis.—ED.]

Thomson's "Malacca"

IN your review (NATURE, vol. xi. p. 207) of Mr. J. Thomson's very interesting work on the "Straits of Malacca, Indo-China, and China," you have justly acknowledged that the author "makes no pretension to have travelled in the interests of science, but only to be a photographer and an observer of the ways of men;" and as his excellent book will no doubt have a wide circulation, it may perhaps not be an unthankful office to correct two statements with reference to the natural history of Penang, which I had some opportunity of studying during a sojourn there of some eighteen months.

Our author, describing the noise made by the insects on Penang Hill, says: "One beetle in particular, known to the natives as the 'trumpeter,' busies himself all day long in producing a booming noise with his wings." Had Mr. Thomson succeeded in observing one of these insects whilst "booming," which he states he was unable to do, I think he would have found the musician to have been no beetle at all, but one of the Cicadidae, and the sound not produced by the wings, but, as is generally known, internally, by the vibration of a membrane set into action by a special muscle. These insects are abundant at Penang, one species, *Dundubia imperatoria*, being particularly large, and which, with several other species, were taken by myself when there. It is nothing unusual for these insects to be wrongly described by natives, as we are told by Mr. Gervase F. Mathew, R.N. (in the *Entomologist's Monthly Magazine*), that in Tobago *Cicada gigas* makes a noise like the whistle of a locomotive; and he was told by the natives that the sound was that of the "tree-locust." At Surinam it is said *Cicada tibicen* is called the "harper," on account of its giving forth a sound like that of a harp.

Mr. Thomson also tells us (p. 35), when describing planter life in Province Wellesley, that the planters, when driving home at night from one estate to another, have the possibility of an encounter with an orang-outan, a rhinoceros, or a tiger. The orang, however, is not found there at all, and I know of no instance of an attack by a rhinoceros. In fact, that animal is so scarce that during my whole stay there the only report of one which I heard was that the animal's dung had been seen in the jungle. Tigers are still anything but scarce, but during my many nightly rides whilst living on the sugar plantations I am happy to say I never heard or saw one, nor was our roll-call ever diminished by that animal. The tiger there is a midnight prowler, but confines himself more to pigs, goats, and dogs. The wild animals are gradually being beaten back by the cultivation of the land, and the same may be said of even the insects. No doubt they abound in the centre of the peninsula, and there also, no doubt, may be found the Negrito stock, of which our author has given us a good photograph as found at Johore.

The illustrations of this very interesting book are excellent, and photography seems to be doing for anthropology what spectrum analysis is still achieving for astronomy.

Streatham Cottage, West Dulwich

W. L. DISTANT

Bees and Flowers

MY children noticed with much interest, last autumn, the curious manner that the bees attacked the flowers of the *Antirrhinum*.