- of the West Riding of Yorkshire. 1857-8. 8vo.—*From the Society.*
- China and its Trade. By John Crawford, F.R.S. 8vo.—*From the Philosophical and Literary Society of Leeds.*
- Sensorial Vision. By Sir J. F. W. Herschel, Bart. 8vo.—*From the same.*
- Annual Report of the Leeds Philosophical and Literary Society for 1857-8. 8vo.—*From the Society.*
- On the Structure of Lecidia lugubris. By W. Lauder Lindsay, M.D. 8vo.—*From the Author.*
- Atti dell' imp. Reg. Istituto Veneto de Scienze, Lettere ed Arti. Dal Novembre 1858 all' Ottobre 1859. Tomo IV. Dispensa Terza. 8vo.—*From the Institute.*
- Transactions of the Botanical Society of Edinburgh. Vol. I. Part 3. Vols. II., III., IV., and V. Proceedings for 1856. Sixth, Seventh, and Eighth Annual Reports and Proceedings for 1841-44. 8vo.—*From the Society.*

Donation to the Museum—

Geological Specimens from the Peak of Teneriffe.—*By Professor C. Piazzi Smyth.*

Monday, 21st March 1859.

PROFESSOR KELLAND, Vice-President, in the Chair.

The following Communications were read:—

1. On some First Principles of a Mental Science, deduced from Correlations of the Primary Laws of Matter and Mind. By Dr Laycock.

The author commences his communication by showing the need that has arisen for a scientific exposition of the laws of thought in relation to the laws of life and organization. In all the practical business of society, as well as of the physician, the phenomena of life and mind are inseparably associated; and consequently without such scientific exposition anything like a scientific application of mental philosophy to medicine and the sciences of human nature,

included under sociology, is impossible. But physiology is itself a derivative science, inasmuch as vital processes are primarily dependent upon certain molecular forces of matter, known as light, heat, chemical affinity, &c. Consequently, if philosophy cannot be separated from physiology or the science of vital function, neither can physiology be separated from physics. Philosophy, therefore, ought to include in one harmonious and comprehensive body of doctrine all the fundamental principles of the natural sciences. It would to this end take cognisance of three great departments of human knowledge—the physical, the vital or biological, and the metaphysical.

The author next shows that as science has already developed in each of these departments a number of general laws which only await higher generalizations to bring them all under laws still more general, and thus secure that unity of the sciences to which they all tend, it is the proper business of philosophy to supply those higher generalizations. These, the author argues, must be derived from the common sense and experience of mankind; for that experience consists in a knowledge of the laws of nature,—not formularized, it is allowed, in express propositions,—but acted upon by man in all his relations. The experience of mankind is *expressed*, however, in at least three different, yet closely related modes—namely, in his language, in the laws which regulate his conduct as a social being, and in his conduct as an individual. If man's experience of the great uniformities of nature, as expressed in these three modes, can be compared with the results of scientific research and formularized into general propositions, these propositions will express fundamental empirical laws fit to be received amongst the highest generalizations of philosophy, considered as a practical knowledge of the general laws of nature. After having shown by illustrations the application of this method of deducing general empirical laws, the author proceeds to examine the generalizations or fundamental ideas implied in the words *law*, *force*, *mind*.

The term *law*, as commonly used, denotes the written or spoken words in or by which is expressed the will of any person or persons, having the power to compel others to adapt their conduct to the will so expressed. Conduct so compelled would be a uniform succession of events occurring according to law. In science, whenever a uniform succession of events or of phenomena in nature is observed to take place, the expression in words or signs of that uniformity is

termed a law. Thus it is a law of nature that air has weight, that all men die, and the like. But, as the order of succession is logically a fixed and necessary order, so the law which represents or expresses the order is logically a necessary law. In this attribute of fixedness the mind recognises a resemblance between the order and the law which expresses it, so that as to the quality of necessity and fixedness, the law and the order are convertible things, and the law stands for the order.

Force is a word arising out of man's experience of this necessary order of events. He finds the fixed order to be an inevitable order, and this idea of inevitableness implies logically an irresistible force or power which compels to or maintains the order. Hence, correlative with order and law there is a conception of the power or force upon which the inevitableness of the order depends. In this way law and force become in language convertible terms; and we speak equally of the law of gravity and the force of gravity,—the laws of attraction and the force of attraction; and we say generally of a thing, that it has the force of law. Nevertheless, the term force has its own meaning, and specially includes or expresses the idea of causation independently of inevitableness. In its strictest sense it is that which compels to the course of events expressed in the law without reference to the formula or the order. Yet the term is used correlatively with the order expressed; so that order, law, and force equally express the same ideas of uniform sequence, fixedness, inevitableness, and an inevitably compelling force. Thus motion in a straight line implies both a force that impels, and an unchanging continuousness in the line of motion until an equal force interrupts or deflects. Starting from these generalizations of the words force and law, the author proceeds to show, that as the primary laws and forces are thus inevitable and fixed, the order which they compel and express can only be modified by equal forces acting according to like laws; since, logically, the inevitable alone can control itself. Hence, he concludes, that all these phenomena of nature which appear to be deviations from the primary forces and laws of nature (as the resistance to the force of gravity which the upright position of man implies, and the like) are in fact due to laws and forces derivative from the primary, and which are therefore secondary and contingent laws and forces. And since the phenomena of nature are all, in fact, deviations from one or two primary laws

or forces, science may be defined to be a knowledge of these deviations from the primary laws and forces, formularized in contingent or derivative laws. Hence, too, the tendency of all the sciences to centre upon a few generalizations. It is, in fact, upon these ideas that the recent doctrines as to the correlations or the physical forces are substantially founded.

The author having called attention to these doctrines, shows that the generalizations he points out extend to sociology. Social laws must, as to society, be logically necessary laws, for without them society cannot exist. If the laws be not executed, society, as held together by law, ceases to exist, and is resolved into its elements. Hence all the laws of society whatever, whether written or implied, are necessarily correlative with a power or force sufficient to compel men to adopt their actions to the prescribed order. In this way we speak of the *force* of opinion in reference to the unwritten natural laws, and of the *requirements* of the law, just as we speak of the necessary laws of nature and the inevitable laws of God.

In determining the generalizations included in the word *mind*, the author observes that, when we speak of the law, or laws, in reference to the conduct of man in society, we not only have in view the fact that there is an order of events or actions to be followed, expressed in law, and a power to compel to that order, or obedience to the law; but we know as a fact of experience that the order is designed with regard to certain ends to be obtained, as *results* of the order. And we can go a step farther, and find that the designer (or designers) either is the force necessary to compel obedience to the designed order, or delegates it to others. In the great uniformities of nature we recognise a similar cause. When we speak of the necessary laws of those uniformities, we not only include a conception of the force which compels the uniformities, but we go beyond it in causation, and think of the something which both designed the order implied in the uniformities, and originated the compelling force. Now this is what men designate mind. It is the first cause in creation, as it is in man's actions. It follows, therefore, that a true mental science should set forth the correlations between mind as manifested in man, and mind as manifested in creation. In addressing himself to this task, the author points out, by way of preliminary remark, that the design must be carefully distinguished from the designer; and the law of design or the expression of the results of

the order, from the thought or the thinker. If we examine the order of phenomena in creation, we can at least conceive (what is analogous to our own experience of our own mental processes and acts), that the whole order of creation was pre-existent in the Divine mind as a thought before the order itself began. But farther, we can also see the logical necessity, that when once the design was made it must be inevitable, for we find that the great laws of nature in which design is expressed are inevitable. Hence a mental law and a mental force both dominate, and are correlative with the physical laws and forces, or the forces of matter. So that there is no such thing in nature as chance; the word only implying the unknown to man as to order, law, and cause, and more especially applicable to derivative laws and forces. It follows, therefore, that what we term physical laws and forces are only lower generalizations of a primary mental law and force, and consequently correlative therewith. Motion and order are thought in act. So that the entire phenomena of creation are under the derivative laws and forces of mind.

Such a generalization implies, however, a change in the method of research. Experience is content to know what is the uniform succession or order of phenomena, and what are the laws and forces correlative therewith; but so soon as a law of design is the object of inquiry, it becomes necessary to examine the order of phenomena with regard to the ends arrived at in the order; that is, to determine the *results* of the uniform succession. Hence *teleology*, or the doctrine of final causes, is as applicable to both physical and biological researches as to the metaphysical, and must be considered the true guide to the highest researches in natural science, just as the law of design and mind subsume all other forces and laws.

Proceeding to apply the teleological method, the author next inquires what is the most general physical result in creation, or "Final cause" of the primary law of design and its correlative force. This result, he argues, must logically be at least the combination of things into wholes, or a whole, of mutually related parts; and such is practically the result in the physical as distinguished from the moral world, of both the general and the derivative laws and forces. The primary forces of matter operate to the *end* that the great masses of matter shall form wholes of mutually related parts, as in our planetary and other solar systems, and in the universe made up of

systems; while the derivative laws and forces operating in life and organization, *result* in an *organism*, which, according to the definition of Kant, "is that in which all the parts are mutually ends and means."

Applying these doctrines to the primary law of consciousness, the author maintains that such a result of the law of design, aimed at and attained, may be designated in relation to the consciousness, the *idea* of unity; in relation to the external world, the *law* of unity. The law implies two things—construction of parts in mutual relation—or *organization*; and action of the parts in mutual relation as a whole, or *individual life*. The fundamental idea of consciousness—the intuition in man of the "I am," or Ego, is the ultimate result presented to the consciousness of these two things. It is the final cause of all those derivative or correlative laws and forces of the primary law of mind and primary forces of matter, which, operating in his body as "teleorganic" laws and forces, or vital laws and forces of adaptation to ends, build up his body into an organism.

In this way (the author proceeds to show) we arrive at the origin of all other necessary or intuitional truths, of which the conception of design itself is one of the most fundamental. The mind of man having thus the results of the great law of design presented to it as intuitive ideas, in virtue of the teleological operation in his organization of the physical and vital forces, must be potentially, and when fully evolved in correlation with organization, actually a microcosm. And it follows, from the correlation of the physical, vital, and mental forces of creation, that all the intuitive ideas of the human mind are to be discovered in the external world, as derivative results of the primary law of design; or, in other words, as ideas of the Great Thought manifested in creation. The author therefore maintains that such a true science of *ideology* or metaphysics as could be built upon these principles, would be fit to take its place at the head of all the natural sciences; for we can thereby attain to a criterion of absolute truth, and correct the dimly felt intuitions of our own consciousness, by comparing them with the fixed, immutable, and eternal conceptions of the Divine mind, as manifested in creation.

The author next proceeds to illustrate these views by special examples. Thus, in *psychology*, he shows that the will is an intui-

tive exercise of power according to the law of design. That pleasure is felt, and the condition is good, when the operations of the forces by which the organism is built up as a whole are in accordance with the ends arrived at, and with the order fixed for those ends; that, on the contrary, pain is felt, and the condition is evil when disorder arises, and the results are in disaccordance with the ends aimed at. It is necessary to bear in mind that the ideas included in general terms correlate each other in psychology as well as in physics. Thus Order, regard being had to its results, is logically correlative with Good; for good in creation is the result of order, and of order alone. Order, again, is as general a law as design; consequently the deviations from the primary law of design, known as evils, are correlative with, and derivative from the primary law of order, just as the physical and vital forces are derivative from the primary forces. Again, perfection correlates the law of order and the law of unity; for, admitting that there are degrees of perfection, the highest perfection is attained when, with the greatest multiplicity or differentiation of parts, there is the most complete unity, or adaptation of those parts to each other as ends and means. This is the perfection of society as well as of organisms.

In *biology*, the author shows that the laws of unity of type and permanence of species are compatible with an empirical law of life—the law of incessant change. The adaptation of an organism to the external world is instinct; but since the operations of the forces of the external world which maintain life, as heat, light, and the like, are constantly varying, so, according to the teleological law, must the phenomena of life and instinct be constantly varying. Hence, correlative with the fixed and immutable law of design, as manifested in unity of type, and derivative therefrom, is the law of incessant change; and this is a primary law of creation as well as of life. For, just as the motion of a planetary body round a centre or centres is due to incessant variations (as marked by every point in the described curve), caused in the line of direction by a deflecting force, so all the variations in organisms, whether animal or vegetable, from the first, or correlative law of design, as manifested in unity of type, are results of deflecting forces, *i. e.*, of external conditions, influencing organisms to change from the type in time and space. In this way, unity of type and permanence of species are correlative with incessant variations in the transmissions of the characters and

instincts of the species, whether they be simply morbid, and known as hereditariness, or appear to give rise to new species.

The author finally shows, that as unity of structure implies unity of function, we have in these principles the foundation for an investigation of what has hitherto been considered wholly inscrutable, namely, the relations of the organization to the consciousness; or, in other words, the connection of body and mind. Mind is not merely inseparably associated with the primary forces of matter; it acts in and by them. Their phenomena are its signs. Hence, since the order of these phenomena and the action of the forces can be expressed numerically, it follows that the results or ends arrived at can be expressed numerically; or, in other words, the teleological laws can be reduced to numerical formula. This can be done already as to nutrition and development, and the *forms* of vegetables and animals; but since all the successional states of our consciousness correspond to successional vital states, occurring according to the teleological law of the physical and vital forces, it is clear that the signs which express the law of succession of the one series, might be made to correspond to the laws of succession of the other. In this way, the brain may be looked upon as the instrument whereby the mind is brought into immediate relation,—not with matter alone,—but with the forces of matter; and our intuitive cognitions may be considered as direct and immediate cognitions of the teleological operations of those forces in our organization.

2. Verbal Notice respecting the Remains of a Seal found at Portobello. By Dr Allman.

Professor Allman called attention to some bones discovered by Dr Andrew Balfour in a clay field near Portobello, and forwarded by him for presentation to the Museum of Natural History. They prove to be bones of a seal, and consist of some vertebræ, a portion of a scapula, a radius, a femur, and a fibula. They thus afford an additional instance to the few already recorded, of the occurrence of phocine remains in the British Islands. The deposit in which they occurred appears to belong to the period of the boulder clay. They were found about 20 feet above the present level of highwater, and about 15 feet below the surface of the soil.