directed to the same object—"thy whole body shall be full of light." This last passage is a complete epitome of Social Science.

These four laws—the laws of tendencies—of singleness—of eigenschaft—and of procedure are, if they be true laws, sufficient to establish my position that Social Science is a true science. The practical bearing of these laws upon our duty as churchmen is reserved for a fifth, the concluding article.

W. OGLE.

ART. VI.—FORCE, MATTER, AND ENERGY.

MUCH is heard in these days of the Conservation of Energy. It is often referred to as a great result of modern physical science, and sometimes with the suggestion, triumphant or uneasy, as the case may be, that it is inconsistent with the reality of free will, and, therefore, with the truth of religion. I have reason to know that this latter view prevails with some men of the highest intellect and culture, and induces them to regard the conservation of energy as something which ought not to be true, and which probably is not true. At the same time, the proof of the theory is generally looked upon as something so abstruse, and requiring so extended a knowledge of mathematics, as to be quite beyond the reach of ordinary men.

It is my conviction, on the contrary, that not only the true meaning, but also the proof of this doctrine can be made tolerably clear to any man or woman of fair intelligence and education; and still more is it my conviction that its truth, which, in common with all physicists, I firmly hold, has no bearing whatever adverse to the truths of Christianity. On the contrary, the principles on which the theory is based may, I believe, be used to bring before our minds fresh and striking views of those great facts which we vaguely denote as the Omnipotence, Omniscience, and Omnipresence of God. The present article is the outcome of these convictions.

All facts which we believe, the conservation of energy not less than others, must rest upon the ground of evidence. Again, this evidence itself must rest upon other facts or beliefs, as each successive story of a building rests on that below it. Thus, pursuing our course downwards, we must arrive at last at the solid earth—that is, at some fact or facts which require no evidence to support them, which are so certain as to carry their own witness with them, which, in one word, are self-evident. It is clear that this must be so, otherwise our building, if not infinitely high, must ultimately rest on nothing. If so, it is obviously of the first importance to lay the foundations aright; in other words, to discover the simple and ultimate facts on which the structure is to be based.

Applying this to the matter in hand, we find that a certain small class of individuals—call them metaphysicians, philosophers, or ontologists—have always been hopelessly at variance among themselves about these fundamental truths, if indeed they have attempted to define them at all. On the other hand, that larger and less self-important body—the physicists or mathematicians, those who have really conquered Nature and founded the empire of science—have always been content to go on one and the same way about the matter. They have always based the science of mechanics, with which we are now dealing, on the three great facts known as space, time, and force.

Over the definition of these we shall not linger. As ultimate facts, indeed, they cannot properly be expressed in terms of other facts; in other words, they cannot be defined. Philosophers have indeed talked of space and time as being forms of consciousness and what not; but with such figments we have nothing to do. We cannot define space and time, but we do not want to define them. We are conscious of both at every waking instant of our lives, and at almost every instant we are conscious also of force; that is to say, we are pulling, or pushing, or lifting, or pressing, or, as we say generally, using force in some way or other.

In its essence, force can no more be defined than space or time itself, but it may be defined in terms of that of which it is the cause; for if we attend to the occasions of our using force, we find that almost always the result we produce is motion of some kind. It may be the lifting of a weight, the turning of a handle, or, perhaps, the gliding of a pen over paper; and even when we fail to produce motion, as when we tug at a weight too heavy for us, we know by experience that we fail, not because our force is not then a cause of motion, but because it is counteracted by another and opposite force. This force we call weight, and this weight is itself a cause of motion, as is seen on leaving the body to itself in the air. Force, in such cases, is said to have a *tendency* to cause motion, but to be counteracted by an opposite force; and this does not impair the general truth of the proposition that force is the cause of motion.

Granting this, we must go on to inquire what is motion? Now, when we say that a body is moving, we mean that it occupies different successive positions in space at successive instants of time—that and nothing else. Motion, then, can be expressed in terms of space and time; and if we have a means of measuring space and time, we shall then also have a means of measuring velocity—that is, the intensity of motion. Now, we are able to measure space and time, and this (by aid of various refinements which we cannot here touch upon) with very great accuracy. A unit of velocity will, therefore, be a unit of space, say one foot, passed over in a unit of time, say one second; and all other velocities will be measured in terms of this unit.

This, of course, assumes that the velocity does not alter during the second when we are measuring it; but as a matter of fact, velocities are continually altering. If, however, we can take a very small interval of time t, and measure the small interval of space s which the body passes through in that time, then the ratio of s to t is the same as the number of feet which the body *would pass through in one second* if the velocity continued uniform; and this will be our measure of velocity.

Next, how are we to measure force? We have seen that force is the cause of motion, and, therefore, if allowed to act freely, it will give motion to the body it acts upon; that is, it will give it a velocity if at rest, and will change its velocity if previously in motion.[1] As we can only measure causes by their effects, we measure force by the amount of the velocity which it thus produces in a given body during a certain given time. To do this we must assume a unit of space, say one foot; a unit of time, say one second; and a unit of body or mass, say the particular piece of matter in the Exchequer Office, which is called the standard pound. Then our unit of force will be that force which acting freely for one second on this pound, will cause it at the end of that time to have a unit of velocity; that is, if left to itself to describe in one second a space of one foot. Other forces will be greater or less than this, as the velocities which they would generate in the same pound are greater or less than one foot per second.

It will be noticed that in the above statement we made a proviso that the force was acting freely. The necessity for this is evident. If I try to lift a weight beyond my strength, I do not produce motion at all, and yet I certainly exert force. We clearly cannot measure this force by the motion produced; how then can we measure it at all? The obvious mode of doing so is to find some standard force, *i.e.*, a force which is always constant and always in the same direction, and then to see how many units of this force will just prevent the force I use from having its proper effect of motion. Fortuuately the weight of bodies—that is, the attraction of the earth upon them—is just such a standard force; a force that is, which, so long as we do not

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[1] The words "rest" and "motion," whenever used, are, of course, relative only. We usually mean by saying a body is at rest, that it has no motion with regard to the surface of the earth; but that surface, as is well known, is itself always in motion, and with an enormous velocity.

move far from one place, is practically constant both in amount and direction. Our standard pound is here again the unit. If I want to know the utmost force my arm can exert, I try how many of such pounds I can just lift, and so in all other cases. There are various machines, especially the balance, by which these stationary or statical forces may be more conveniently measured; but they all act on the same principle.

Having thus established modes of measuring force, we are able to examine its laws. Taking force generally, it is clear that it has at any instant some definite direction and some definite amount. These are the relations of force to space. Its direction, at any instant, will be given by the direction in which it causes the body to move; its amount, by the velocity which it imparts to the body. As regards successive instants of time, forces may either alter or remain the same; in other words, they may be either constant or variable.

There are innumerable ways in which forces may be supposed to act under these conditions, but there is only one of these which we need consider, because it is that which appears to be universal in Nature. Forces so acting are called central forces. Their peculiarity is that their direction is always in the line joining the body acted upon (which we may treat for the present as inconceivably small), to some definite point in space. This is called the centre of the force. The amount of the force is also a function of the distance between the body and the centre; that is, it is a quantity which depends upon the value of that distance, and varies with it. Again, the fact that one body has a force acting on it which proceeds from a given centre, does not prevent the same centre from acting upon another body or upon any number of other bodies. And the action upon all these will be exactly similar; *i.e.*, if the bodies are of equal size, the forces acting upon them at equal distances from the centre will be equal. Lastly, the force may either act *towards* the centre, so that the body, if it moves, will get nearer to it; or it may act *from* the centre, so that the body, if it moves, will get farther away. In the first case the force is said to be attractive; in the second, repulsive.

Now it appears that all the leading facts of force and motion in Nature may be explained, if we suppose that what we call matter consists of an immense number of centres of force, all acting upon each other. The laws of the action are such that as long as two centres of force remain at the same distance from each other, the forces acting between them are equal and opposite, and remain constant for any length of time; which latter fact is expressed by saying that the force is not a function of the time. On the other hand, if the distance alters, the mutual forces, whilst remaining equal and opposite, alter with it in some particular ratio; which fact is expressed by saying that the force is a function of the distance. For all sensible distances the law according to which the force varies is that of the inverse square, by which is meant that if we call the force at 1 foot distance 7, then the force at 2 feet will be $\frac{7}{4}$, the force at 3 feet $\frac{7}{9}$, etc. This is Newton's law of gravitation, viz., that every particle of matter in the universe attracts every other with a force varying inversely as the square of the distance. But at very small distances the law must be such that the net effect of the force will be the reverse. It is now repulsive instead of attractive, and prevents the two particles from rushing together, as they otherwise would do, with infinite speed. The exact law of forces at these very small distances is unfortunately unknown—its discovery awaits the birth of a second Newton; it is these forces, however, which we call forces of cohesion, which combine groups of centres into bodies or masses of matter that can be handled or moved as single wholes.

As the conception of central forces is one which it is absolutely necessary we should grasp, a further illustration of it may be forgiven. Let us suppose, as Clerk-Maxwell has supposed before us, the existence of a "demon," a living, active, thinking creature, but so excessively minute that he is able to pass between these ultimate centres of force, and consider and deal with them as separate objects. Suppose such a creature to approach a single centre of force, so far isolated that he can treat it altogether apart from its neighbours; what will be its effect upon him? and how will this vary as his position varies in relation to it? When still at some distance he will feel himself pulled with a certain definite force in a certain definite direction. Suppose him able to resist the pull, and that he moves at right angles to the direction in which it tends. He will find that as he moves the direction of the pull alters, and that to keep at right angles to it he must circle about on the surface of a sphere towards the centre of which the pull is always tending. This centre, in fact, is the position of the centre of force he is investigating. He will see nothing there, hear nothing from thence, but wherever he moves he will still feel the constant drawing towards that particular point. Let him now approach nearer to the point—he will find himself still drawn towards it and with an increasing strength. If he can measure the strength at different points he will find it grow larger as the square of the distance grows smaller; that at half the distance it is four times as great, at one-third of the distance nine times as great, and so on. But as he gets nearer still he will find that a change occurs, the pull increases more slowly, becomes stationary, decreases, and vanishes. A point of equilibrium is reached, where the effect of the centre has apparently died away. But let him approach nearer still, and the effect recommences; not now as a pull, but as a push—a repulsive, not an attractive force: and this repulsion increases so rapidly that, however great his power, it will very soon bring him to a standstill. Do what he will, he can never reach the centre of his ideal sphere, any more than we can squeeze an elastic ball into nothing. And if he now retrace his steps the repulsion will die away as it arose, the position of no force will be reached, and the pull will recommence, will increase, will reach a maximum, and will then decrease according to the old law of the inverse square, as he gets farther and farther away from the mysterious centre; nor if he live a million years will there be the slightest change in this cycle of events, ever ready to recommence as he recommences his journey to or from that particular point of space in which the invisible virtue resides.

I need not say that this conception of matter is entirely different from that of the philosopher. He, if he admits the existence of matter at all, holds that it consists of ultimate atoms which are simply very small and very hard blocks of some definite shape, which could, by sufficient magnifying power, be made visible to the eye. Mr. Herbert Spencer even lays down that the ultimate atoms of each kind of article must be different from those of other kinds; so that our demon should be able at once to recognise the particular block before him as belonging, say, to water, not to wood. His ultimate atom has thus all the complicated properties which belong to finite bodies, such as we can see and handle; and it has in addition a something called Substance, which substance the philosopher believes must exist, though he is entirely unable to say what it is, and knows nothing whatever about it except that he knows, and can know, nothing. On the other hand, the conception I have endeavoured to illustrate, when once grasped, is perfectly simple and clear: the only uncertainty about it arises from our not knowing the exact laws under which the force acts at such distances—a knowledge which it is to be hoped we shall one day acquire.

This centre of force is then the primal element, out of which the physical atom, then the molecule or compound atom, and lastly the mass or body of visible size, are compacted and built up. All the phenomena of mechanics are ultimately traceable to the interaction of such centres of force, ever altering in ceaseless dance their relations to each other, but ever keeping their own nature and laws unaltered, to whatever part of space they may transport themselves.

Adopting, then, the hypothesis that mechanical action is to be accounted for by the play of central forces, we must next inquire what are the fundamental laws which govern this action.

These are usually given under the name of Newton's Three Laws of Motion, and may be expressed as follows:

First Law of Motion. Every body continues in its condition of rest, or of uniform motion in a straight line, except in so far as it is compelled by impressed forces to change its condition.

Second Law of Motion. When any number of forces act upon a body in motion, each produces its whole effect, as if it acted singly upon the body at rest.

Third Law of Motion. Reaction is always equal and opposite to action.

In all investigations on mechanics the truth of these laws is assumed, and they are generally cited as independent axioms drawn from experience, and confirmed by experimental facts. There is, however, a principle from which they may be deduced by the help of our definitions of force and matter. This principle is, perhaps, the widest generalization that has been made in the domain of Nature. It is the fundamental fact which lies at the basis of all truths in mechanics, and through them, probably, of all truths whatever in physical science. It may be called the Principle of Conservation, and it may be expressed by two words, "Effects live." By this is meant that the effect of any physical cause does not die away or cease as soon as the cause is withdrawn; nay, more, it will not cease at all, but will continue to live by its own vitality, as it were, unless and until it is actually put an end to by some other action of the opposite character. In a word, an effect does not cease of itself, it is only destroyed. And even when destroyed it is not as though it had never been, for its destruction in itself produces an effect, and in some way an equivalent effect, on the agent which has destroyed it; so that in its action on this agent it may still be said to live, unless and until that action is likewise destroyed by some third agent, to which, in turn, it also communicates an equivalent effect; and so the generation is continued for ever.

The proof of the principle of conservation, like that of most other generalizations, lies mainly in the fact that the evidence in its favour is continually augmenting, while that against it is continually diminishing, as the progress of science reveals to us more and more of the workings of the universe. That it is true to some extent is shown by everyday facts; as that a stone continues to fly after it has left the hand; that waves continue to roll after the wind has dropped; that the horse-shoe continues to glow after it has been withdrawn from the fire; and so forth. On the other hand, the apparent exceptions—*i.e.*, the cases in which effects seem to die out altogether, after a longer or shorter interval—are so many that it is not to be wondered at if, for many ages, the principle failed to impress itself on the human mind. But the progress of modern science has shown so many of the exceptions to be apparent only, not real, and has at the same time brought to light so many additional instances of the rule, that the current of thought has changed; and the danger is now lest men should follow the rule too blindly and implicitly, and extend it to regions where it has not been shown to hold.

If, then, we grant this general principle, we have no difficulty in deducing the two first laws of motion. Thus motion is the effect of force, and, therefore, by the principle, when a body has once been moved it will continue to retain that effect of motion, unchanged either in intensity or direction, unless and until some other force intervenes. But this is the first law of motion. Again, if a force, in the presence of any circumstance, fails to have its full effect of motion, this can only be from one of two reasons. Either the force is prevented from acting, or, although it acts, yet the effect disappears. But, by our definition of matter, forces are always acting, and by the principle of conservation effects do not disappear. Hence, whatever the circumstances, force will never fail of its full effect, which is the second law of motion.[1]

As to the third law of motion, so long as we consider two centres of force, it is simply a restatement of what has been said in our definition of matter. For two such centres are always acting upon each other with equal and opposite forces; and if we call one of these the action, the other will be the re-action. When we come to finite bodies, it will still be true that the effect which the first set of forces produces on the second, is equal and opposite to that which the second set produces upon the first; for these finite bodies are after all made up of individual centres. How are these effects to be measured?

To answer this we must determine what is the effect of a force which, proceeding from a given centre, has acted for a certain time upon a body in motion relatively to that centre. To see this clearly, let us suppose that the force acts not continuously at every point in the distance between the two bodies, but by jerks, as it were, or discontinuous impulses at certain

[1] A word is, perhaps, necessary to explain what "full effect" means. Suppose, for example, a body were acted upon by a pull of 6 lb. to the north, and another of 5 lb. to the south. In saying that each of these has its full effect, we do not, of course, mean that the body moves northward and southward at the same time. The body moves northward only; but its northward velocity is diminished by precisely that amount of velocity which the 5 lb. pull would have caused if that pull had been the only one acting. In other words, it moves as if it were acted on by a single pull of 1 lb. to the northward. The 5 lb. force has its full effect; but it is an effect of stopping motion, not of generating it.

intervals.[1] Suppose, for instance, the interval to be the $\frac{1}{1000}$ of an inch, and that the two bodies were originally 10 inches apart. Then the moving body would receive an impulse which would start it in the direction of the fixed body or centre. This impulse would be quite instantaneous, but would produce a certain small effect of motion. Whilst the body was moving over the first $\frac{1}{1000}$ inch, no force would act upon it, and therefore by the first law of motion it would move with uniform velocity. When, however, it reached the end of this interval it would receive a second impulse exactly like the first, which by the second law of motion would have its full effect, and which, therefore, would just double its previous velocity. With this double velocity it would move over the second interval, and at the end of that would receive a third impulse, which would make the velocity in the third interval three times what it was in the first. So the process would continue; and when the body had approached to the centre by 1 inch it would have received a thousand impulses, and would have a velocity one thousand times that which it had at starting.

We are now in a position to see what the effect of the force in the way of creating motion in the body has really been. (1) It is evident that the more intense the impulses the greater will be the effect; but the sum of the impulses represents the total action of the force, and therefore we may say that the greater the force acting the greater will be the effect. (2) The total effect by the second law of motion is simply the sum of the effects due to the various impulses. Hence the effect varies as the number of those impulses. In other words, when the body has moved over one inch the effect is a thousand times as great as when it had moved over $\frac{1}{1000}$ inch only; but this is the same thing as saying that the effect is proportioned to the space passed over. Thus we see that the effect we are considering varies conjointly with the force, and with the space passed over in the direction of the force.

It will be seen that this product is concerned entirely with the attracting force. It gives us no information as to the velocity of the body moved, when it has passed over the space under consideration. It can easily be shown, however, by mathematics, that the effect, as concerns the body moved, varies conjointly as its mass and the square of the velocity acquired. The mass here represents really the number of centres of force

[1] By simply making these intervals small enough, the result of their action may always be made to approximate, as nearly as we please, to the total effect of the real continuous force. This is a well-known principle, which is universally applied in mathematics. In reality the successive impulses will not be equal; but the assumption of equality simplifies the ideas, while it does not affect the general results.

contained in the body; but as these are impossible to count, the mass is measured by its weight (or the attraction of the earth upon it), which will always be proportional to the number of centres.

And now we come to the central point of this disquisition. Let us recur to the passage where the force was supposed to act by impulses, say at every $\frac{1}{1000}$ part of an inch. Supposing the body to be originally 10 inches from the centre, there will be 10,000 of these impulses, all of which may act and produce their effect on the body before it actually reaches the centre. The centre has, therefore, the power of causing these 10,000 impulses to act on the body and produce their effect in Work, which work may consist either in increasing the body's velocity or in overcoming resistance to its motion. This *power* has received the technical name of Energy. Whenever energy is mentioned in physical discussions it means this, and nothing but this, viz. the power of doing work; and the amount of energy possessed by a body under any circumstances is measured by the amount of work it can do. Thus, in the present case, the energy of the centre, as related to the moving body, is measured by the effect of all the 10,000 impulses which it can generate upon the body. But now let us suppose the body to have moved, as before, to a distance of 9 inches only, then 1,000 out of the 10,000 impulses will have been given, and the energy possessed by the centre will be represented by the remaining 9,000 only. The centre is thus poorer in energy than it was before; in other words, there has been a loss of energy to the amount represented by the effect of the 1,000 impulses. But has this energy been lost altogether? No. By the principle of conservation the effect of these impulses lives in the moving body, giving it an increased power of doing work; and will continue to live, unless and until, by the exertion of energy on the part of that body upon a third, it is destroyed, and reappears as energy of that third body. Thus there is a gain of energy to the moving body, and it is exactly equivalent to the loss of energy sustained by the centre. Therefore, if we consider the body and the centre as forming one system, we may say that there has been no loss or gain of energy on the whole; or in technical phrase, that the energy has been *conserved* during the motion. This, and nothing but this, is what physicists mean when they speak of the Conservation of Energy.

The proof of this principle, as given in books of Mechanics, is, of course, a much more elaborate matter than the above. It is based, however, purely on the laws of motion, which, as we have seen, rest themselves on the principle of conservation. Its length and complication arise (1) from the necessity of tracing out the action of the forces in detail, and (2) from the need of extending the principle to a system composed of any number of centres or particles.

This, then, is the principle of which we have heard so much; and it is true, beyond all possibility of doubt, *provided* the assumptions which are contained in the above statement really hold in the particular case considered. That is to say, the system must be one of centres of force, such as was described in our definition of matter; it must be independent of all other forces; and the principle of conservation—or the Laws of Motion, its equivalent—must hold in this case.

Such a principle, considered in an abstract light, will probably not excite much interest—certainly no alarm. Yet the idea of the conservation of energy has undoubtedly given rise to both. This is due, however, not to the principle itself, but to a further assumption which is frequently made, viz. that the universe, as a whole, or those parts of it with which we are concerned, form a system to which the principle applies. Whether this assumption is justified or not is a matter for proof. To make it without proof, as is done every day, is a wholly unwarrantable action, quite unworthy of men of science. The inquiry, however, is a very large one, and we must content ourselves with stating the results, so far as they have been attained at the present time.

In the first place, the principle is not *accurately* true of anything short of the whole universe, including not only ordinary matter, but also the medium or ether which conveys the undulations of light and heat. For, by the law of gravitation, every particle of matter acts on every other particle. The phenomema of radiation shows that there is also action between the particles of matter and those of the ether. Hence no part of the universe is independent of any other part; and, therefore, of no one part can the conservation of energy be accurately true. Secondly, there are parts or systems in the universe which are so far isolated that the actions of the other parts upon them are exceedingly small as compared with the mutual actions within the system. For instance, the solar system, consisting of the sun and the planets, may generally be considered as if independent of other bodies, on account of the immense distance of the fixed stars, the tenuity of the comets, and the small size of the meteorites. The conservation of energy would, therefore, hold practically for the solar system, were it not for the radiation of heat which is continually going on into interstellar space, occasioning a loss of energy for which, as yet, no compensation has been proved to exist. Thirdly, confining ourselves to the action of bodies on the surface of the earth, within our own observation, there is every reason to believe that such bodies form *part* of a system to which the conservation of energy applies; and, therefore, whenever a body is seen to lose energy, there is a corresponding gain of energy in some bodies in its neighbourhood. The most familiar case of such transfer of energy is when one moving body communicates motion to another. Again, it is beyond all doubt that what we call heat is due to a very rapid vibratory motion of the particles of a body, and that this motion can be converted into motion of other bodies as a whole. Thus when steam enters the cylinder of a steam-engine, it produces motion in the piston and the mechanism attached to it; but the steam itself loses heat in doing so. Again, the conversion of what is called chemical energy into heat, is a fact of which we have evidence whenever we light a fire; and the conversion of electricity into heat and work, or *vice versâ*, has become a familiar fact since the introduction of the dynamo machine.

We are thus justified in concluding that for the ordinary operations of Nature, as they may be called, the principle holds in the sense that no apparent loss of energy is real loss to the world at large, although it may continue its existence in other bodies and in other forms. The converse question, whether every gain of energy by one body is due to a previous loss of energy from another body, is quite a different one. So far as the ordinary working of inorganic Nature is concerned, it may be fairly said that no such gain of energy has actually been observed. It is, therefore, probably true that, as Clerk-Maxwell has expressed it, the molecules of matter have remained precisely the same in their properties and powers from the beginning of the world's history. Such a conclusion, however, would be wholly unwarranted in the case of organic Nature; for it is an obvious fact of observation that there is a difference in kind between the operations of organic and of inorganic bodies. In fact, as regards the only part of organic nature of which I really know anything—namely, myself—I find at least some grounds for thinking that my will is able to modify and increase, though no doubt to a slight extent only, the mechanical energy existing in my body.

Lastly, it may be well to point out the gross error committed by some philosophers, who assert that the conservation of energy may be assumed as a necessary truth, independent of all experience. If anything comes out clear from the present elucidation of the question, it is the extravagant and even ludicrous absurdity of this assertion. The theory, as we have seen, rests ultimately upon what we have called the principle of conservation, viz., that "effects live." So far from this being a necessary and obvious truth, it was disbelieved until recent times by the whole world, and by many persons is disbelieved yet; in fact, the apparent exceptions—the cases where effects seem to die away altogether after a greater or less time—are so many, that such disbelief is perfectly natural. We now know that in all such cases, so far as they can be examined, the effect does not really die away, but is destroyed by a counteracting cause; and therefore, the exception is apparent only, not real. But to prove this has required many years of patient thought, labour, and observation on the part of, perhaps, the greatest intellects which the world has yet seen; and to erect a doctrine thus proved into a necessary axiom needing no proof, requires all the rashness of ignorance, and all the arrogance of philosophy.

WALTER R. BROWNE.

Reviews.

Six Months in the Ranks; or, The Gentleman Private, pp. 362. Smith, Elder, and Co.

A LEADING feature of this age undoubtedly is to look behind the scenes; to seek the "why and wherefore" of everything. It is a feeling begotten in part of what is laudable, in part—very large—of what is much the contrary. On the one hand a higher order of education leading up to acquisition of truth; on the other, the mere cravings of satiety.

Periodicals teem with minute descriptions of "inner life," which in our early days would have been considered strangely out of place, inappropriate, or worse. Hence, in one phase, an unwarrantable obtrusion into the privacy of people of note, culminating now and then in the Law Courts. In some measure the origin of this evil may, perhaps, be laid at the door of our Transatlantic Cousins, with whom, on several grounds, the procedure admits of palliation. But, in any case, this Athenian characteristic has obtained a foothold with us. Some future Juvenal may find food for his pen when looking back to an age sufficiently illustrative of St. Luke's words.

On the more healthy lines of public curiosity, the Army has furnished subject matter. True we have now no military artist, such as Charles Lever, to throw a glamour over a soldier's life. Whyte-Melville, indeed, well pictured some peace aspects of the scene. But "milk and water" have characterized the abundant ephemeral works of military novelists of recent times. The true romance is to be found only in Napier's thrilling pages of the "Peninsular War," from which Lever borrowed largely.

Prison-life, behind the curtain, has its day; so likewise that of the Army. It is the less remarkable that the latter should be on the tâpis, because, in one guise or the other, the soldier crops up continually before Parliament. At one time one hears complaints of the paucity of recruits; now it is his physique; then his immature age for campaigning; again his social status.

The last incident on this latter head, reaches us from Windsor, where a fashionable hotel-keeper comes off indifferently at the hands of a clerical defender of the Life-guardsman. As we are more and more assimilating the features of continental service with our own, it is cer-