

been urged that man has no right to inflict pain on animals. The same argument has been urged against the destruction of the life of animals at all, and the adoption of a vegetarian diet has been the result. It is surely not needful to answer the last argument here, but in a degree the answer is the same against giving pain to animals; if we take animal life for the purpose of food, it is only taking the life we have given us for the purpose of our existence; and in giving a minimum of pain to animals we give it for the higher purposes of securing human life and freedom from pain. It is curious to see those who defend the cruel sports of fox-hunting, hare-hunting, and partridge and pheasant shooting, exclaim against the cruelty of vivisection. Yet it could be clearly shown, we believe, that those physiologists who are in the habit of practising vivisection would not be found at Hurlingham taking part in pigeon-shooting, or meeting with the hounds in any part of the country. In fact, so far from producing a hardening effect on the mind, these experiments seem to engender in the mind of the observer a love and a care for the brute creation, that does not exist in the mind of an ordinary person. A celebrated entomologist, in answer to the objection made to the pursuit of his science, the destruction of the life of insects, made answer that his habit of observing insects had induced him at various times to save more lives of insects—as flies from the cream-jug and tea-cup—than he had ever destroyed to make his entomological collection.

The question still arises whether the experiments that resulted in the discoveries to which we have referred should be repeated for the instruction of a class, or be regarded as final? Many physiologists think that the renewal of the experiments in the form of a demonstration before a class is not necessary. This position, however, cannot be maintained, if regard is had to the good of mankind. He would be a poor chemist who did not re-perform the experiments of those who had gone before him; and the natural philosopher could not make progress in his science if forbidden to repeat the observations of his predecessors. It is not only necessary to make good practitioners of medicine, and surgery that these experiments should be repeated but it is necessary for the advancement of the science of physiology.

Of course all these experiments should be performed with the greatest attention to diminishing pain to the utmost extent. Happily, by the use of anæsthetics, we can now do this so that an animal does not suffer more than it would in passing out of existence in any other way. And we are glad to find whilst writing this, that Prof. Schiff, of Florence, who has been so unrighteously assailed for these experiments, in a letter to the *Times* completely refutes all the charges brought against him, never failing to administer anæsthetics in the performance of these operations.

#### THE RELATION OF MIND AND BODY

*Mind and Body. The Theories of their Relation.* By Alexander Bain, LL.D., Professor of Logic in the University of Aberdeen. (Henry S. King and Co., 1873.)

IN this volume, which forms one of the international scientific series, the thoughtful reader is once more called on to consider those leading positions in psycho-

logy for which Prof. Bain has so long and so ably contended. He has here succeeded in presenting his views in language as concise, clear, and popular as the nature of his subject will permit. Whoever attaches importance to the application of scientific method to mental phenomena must welcome this popular statement of doctrines, which, if not the whole truth, are immeasurably nearer the truth than are the superstitions to which not only the uneducated, but also the great mass of the learned, are subject.

It is already known that Prof. Bain has given his adhesion, more or less fully, to the doctrine of inheritance in the region both of intellect and emotion—a doctrine without which the “experience” philosophy was utterly inadequate to explain the known facts. We may therefore be allowed to regret that he has not in this volume given more prominence to a conception without which his own system is but a half truth plus something of positive error. We are disappointed, for we certainly expected more than grudging references to “the new theory.”

We have before now indicated our opinion that there is something wrong about Prof. Bain's celebrated theory of the Will; and we cannot now refrain from observing that in the present volume he seems to us to make the weakness of his position more manifest by placing alongside of his old theory some of the clearer and more thorough conceptions of recent development. “The distinguishing peculiarity of our voluntary movements,” says Prof. Bain, “is that they take their rise in Feeling, and are guided by Intellect.” Now our contention is, that there is no fact in nature corresponding to this description. Taking it for granted that “feeling” and “intellect” here mean facts of consciousness, and not physical facts—the objective activity of nerve cells and nerve fibres—we assert (1) that taken in the lump it is an expression of the popular notion, which Prof. Bain rejects, that the body is governed by the mind somewhat in the same way that the horse is governed by his rider; (2) that looked at closely it is a string of words making up a proposition that cannot be represented in thought. In support of the first point in our criticism it must suffice to show that Prof. Bain's teaching with regard to the will is relied on by the most thoughtful advocates of the doctrine of the soul—a belief against which Prof. Bain has been fighting all his life. A perfect example of the way in which Prof. Bain's theory is interpreted in favour of the hypothesis of a soul will be found in Mr. Lowne's “Philosophy of Evolution.” We had recently occasion to make a few remarks on this essay, and we cannot now do better than quote part of what we then wrote:—“It is in studying the phenomena of volition (as understood by Prof. Bain) that Mr. Lowne finds the unmistakable evidence of a spiritual clerk employed in working the nervous apparatus. . . . Comparing the nervous system to a complex telegraphic system, he says:—‘If the electric fluid became periodically liberated and affected all the instruments at once, or in a given succession, mechanism alone would account for the phenomena (reflex action); but if the electric current were always utilised according to ever-varying conditions which do not bear any direct relation to the manner in which the effect is produced—that is, which are them-

selves unable to alter the arrangement of the apparatus by which the effects are brought about—a guiding intelligence is needed (voluntary action). Such appears to be the condition of the nervous system in the higher forms of life; and we recognise such a guiding power, although we know of its existence only by its effects on the organic mechanism; and we speak of it as the mind or soul.” It is for those who, holding Prof. Bain’s theory of volition, reject the popular hypothesis that the body is endowed with a soul, to show the flaw in Prof. Lowne’s argument. In saying this, however, we by no means wish to imply that there is not much in the writings of Prof. Bain quite inconsistent with this interpretation of his doctrine. Indeed we find set out with remarkable clearness in the volume before us some of the considerations which we urged, not against Mr. Lowne’s argument, but against the theory of volition on which it is founded. “There is no warrant for the assumption (we said) that any movement of the kind called voluntary is not as completely and necessarily the result of purely physical antecedents, as are the movements of the planets or the spelling out of a telegraphic message . . . Whatever may be the link of connection between consciousness and nervous action, it seems both unnecessary and irrational to assert that either the amount or the direction of any nervous discharge depends in the slightest degree on the state of consciousness that preceded or accompanies it.

Sitting in his easy chair, Mr. Brown debates with himself how much he will give to the Mill Memorial Fund. Greed, small vanity, respect for Mr. Mill, the fear of being thought shabby, and perhaps a score of other mental states come and go, and at last he writes a cheque for 5*l*. Mr. Brown was aware of the mental side of his deliberations, while the corresponding physical changes in his nervous system were hidden from his observation. Hence the easy mistake of supposing that in writing out the cheque the fingers moved in obedience to spiritual direction.” This view seemed, and still seems to us, to forbid every conceivable interpretation of the proposition that movements “take their rise in feeling and are guided by intellect.” It would appear, however, that what we feel to be an incongruity, does not strike Prof. Bain as such. For he also, if we understand him aright, believes the physical chain to be at all points complete and sufficient within itself. At least we find it difficult to understand the following extract from the chapter “How are Mind and Body united?” in any other sense. “From the ingress of a sensation, to the outgoing response in action, the mental succession is not for an instant dis severed from a physical succession. A new prospect bursts upon the view; there is a mental result of sensation, motion, thought, terminating in outward displays of speech or gesture. Parallel to this series is the physical series of facts, the successive agitation of the physical organs, called the eye, the retina, the optic nerve, optic centres, cerebral hemispheres, outgoing nerves, muscles, &c. While we go the round of the mental circle of sensation, emotion, and thought there is an unbroken physical circle of effects. It would be incompatible with everything we know of the cerebral actions to suppose that the physical chain ends abruptly in a physical void occupied by an immaterial substance; which immaterial substance, after working alone, imparts its results to the

other edge of the physical break, and determines the active response—two shores of the material with an intervening ocean of the immaterial.” Now remembering that movements of all kinds are physical facts, have their place in the “unbroken material succession,” we once more put the question—In what sense can a particular class of movements be said to take their rise in the mental series which runs parallel to, without forming part of, the physical series?

The truth or meaning of our assertion that the proposition, “movements take their rise in feeling,” cannot be rendered into thought, may now be perceived by anyone who will attempt to picture to themselves a state of consciousness turning on, or in any way determining the direction of, a nervous discharge. But as some of our philosophers, strong in logic, can surmount psychological impossibilities with the same ease that our divines can rise above them on the wings of faith, the disciples of Mr. Mill and Prof. Bain may demur that the question is not one of conceivableness or inconceivableness, but of proof. Well, then, let them show, if they can, that they have any better ground for the opinion that voluntary movements take their rise in feeling and are guided by intellect, than a superficial observer ignorant of the construction of the steam-engine might have for a belief that the movements of a locomotive take their rise in noise and are guided by smoke. Should it be attempted to turn the point of the foregoing argument by aid of the curious description of a mental fact, that it is a “two-sided fact”—both body and mind—our difficulty only requires to be restated. In what sense can a movement called voluntary—the objective side of a “mental fact”—take its rise in feeling the subjective side of the same “two-sided fact”? Using Prof. Bain’s own words, “it is, after all, body acting upon body.”

In this work Prof. Bain does not advance his idealism; probably he may have concluded, and justly, that it would prove too metaphysical for the readers of the International Scientific Series. Throughout his language is that of a realist. Mind and Matter seem to be accepted as ultimate facts; and “the institution of two distinct entities” is spoken of as “not in itself a crushing dispensation.” Not only so, in such expressions as “undivided twins,” “one substance, with two sets of properties, two sides, the physical and the mental—a double-faced unity,” we have, to say the least, very much of the ring of Mr. Spencer’s hypothesis that nervous action and consciousness are the objective and the subjective faces of his Unknowable—the one Ultimate Reality. We do not say that Prof. Bain is attempting the dangerous experiment of trying to put new wine into old bottles, but we fear until he has explained more fully the modifications which, by changes or additions, he means to make in his system, his present deliverance will be apt to suggest this.

DOUGLAS A. SPALDING

#### THE ELEMENTS OF LOGARITHMS

*The Elements of Logarithms.* By J. M. Peirce. (Boston, U.S.A.: Ginn Brothers, 1873.)

IN the preface Prof. Peirce writes:—“Logarithms ought not to be comprised, as they often are, in the midst of a treatise on algebra. For, in the first