even by the thickening or induration of the fibrous basis. For this reason, simple atrophy is sure to be overlooked, unless its traces be sought for in the manner I have described. In the centre of a lung very many lobules may be entirely atrophied, and leave no visible or tangible evidence of their previous existence." In such cases we may find emphysema as the sole lesion in the lungs, or find it accompanied with intercurrent non-atrophic affections.

In closing our notice, we must again recommend Dr West's book as one of very high merit, and the best on the subject in the English language.

ART. II.—*Psychological Inquiries, in a series of Essays intended to illustrate the mutual relation of the Physical Organization and the Mental Faculties.* 12mo. pp. 264, LONGMAN: London, 1854.

It is no secret that the little work before us is from the pen of Sir Benjamin Brodie. It rejoices us to see a veteran of his high standing bestow the well-earned leisure of his later days on a subject so full of important consequences to the future welfare of society as psychological inquiry. We should prize the example set by such a man as Sir Benjamin, were the contribution of less value than it actually is. For we boast to be of the number of those who think that psychological inquiry has much good in store for after generations. And we feel satisfied that it is by the thinking men of our own profession that no small share of that good must be wrought out.

The departments of knowledge which have been hitherto carried to the greatest height of advancement are those which either admit of being subjected in their conclusions to the tests of number and quantity, or accommodate themselves to a nomenclature, representing objects of sense, so that as often as a misapprehension anywhere occurs, it is susceptible of a ready correction. All mathematical research, however profound, is but an immensely enlarged development of the primitive reckoning by measures and counters. Nearly all physical phenomena are reducible to sensible experiment or to calculation. The several departments of natural history, for the most part, rest on the exact observation, by the senses, of appearances and of qualities with or without the aid of instruments. But there are numerous departments of human knowledge, the language of which, whether as respects the

particulars on which their essential principles are founded, or the inferences deduced from such principles, is descriptive solely of ideas of the understanding, which refuse to conform to any standard of sense. Such departments may be described, in a large way, as resting on the metaphysical. All these branches of knowledge are very backward in their progress at present, as compared with physical science and natural history, and among them unfortunately stands a great part of medicine. If the cultivation then of psychology can finally habituate men to the exact use of language which does not refer to sensible things, how many doubts, difficulties, misapprehensions, discussions, and controversies would be saved! The mere study of psychology or metaphysics does not necessarily convert a man who is naturally a bad reasoner into a clear-headed person. But few men reason badly when they understand all the import of the terms they use. It is not understanding, so much as exact knowledge, when sensible images fail, that is wanted. In his first Essay or Dialogue, Sir Benjamin makes the speaker who represents himself remark that "the faculty of reasoning correctly (or what is commonly called a clear head) is for the most part a natural gift, and that it admits of being artificially improved only in a limited degree." We would suggest to Sir Benjamin that the cause why so few, who have not the natural gift of reasoning, can be taught, is that no attainments in the rules of reasoning can compensate for a defect in the appreciation of the nicer shades of language on the subjects under discussion. We cannot but regard the cultivation of metaphysics as the best introduction to the use of language as an instrument of thought and reasoning on subjects not referrible to sense.

Metaphysics, it is true, have never yet been cultivated to any great general good among men—the effect of their general cultivation in former ages was to carry wrangling upon absurd topics to an extravagant extent. But that was at a time when the necessity of accumulating useful facts was little understood. The artist displayed his skill upon frivolous topics, because the materials to work up into productions of value were not supplied to him.

If, as is not unlikely, the physical sciences shall begin ere long to afford less scope for the exercise of human genius and industry, it may be confidently anticipated that man's mental energies will become more generally turned to those departments of knowledge which possess a psychical character, and that the world will then learn to appreciate the real value of metaphysical pursuits. Of the wide-spread capa-

bility among men for the profoundest metaphysical researches no doubt need be entertained; let the inducements only arise for its prosecution. Of this, no one at least can doubt who is a convert to the belief, that the most signal development of the metaphysical capabilities of the human mind which the world has as yet seen, took place under the most disadvantageous circumstances as to study, namely, in those times which owing to the clouds that intercepted the diffusion of knowledge among the people, are truly termed the dark ages. That it was fruitful in words, but barren of works, Sir William Hamilton says, "is the vulgar opinion in regard to the scholastic philosophy. The few are, however, now aware that the human mind, though partially, was never more powerfully developed than during the middle ages."¹

Sir Benjamin describes his inquiries "as intended to illustrate the mutual relations of the physical organization and the mental faculties." A work confined to this end is not strictly a metaphysical work, but a contribution from physiology to metaphysics, and this description, better than any other, truly denotes the character of Sir Benjamin's book. It is obviously in this line that the medical profession can most profitably aid in the advancement of metaphysics. Dr Reid, as Sir Benjamin remarks, by his work on the senses, was one of the first among metaphysicians to set the example of combining the inquiries proper to the metaphysician with those which belong to the physiologist.

It is the subject of sensation which is common ground to the metaphysician and the physiologist. And here unquestionably the conclusions of the physiologist are capable of throwing much light on the speculations of the metaphysician. The metaphysician recognises sensation as one of the most prominent phenomena of consciousness, but all that he knows thereupon beyond what he is taught by reflection on the subjects of consciousness, he learns from the physiologist. He is not entitled to claim for his own science even the belief that the brain and nerves are concerned in sensation—that he knows only through physiology. Physiology, however, can teach much more than this regarding sensation—and it is high time that a formal inquiry were instituted to ascertain how far the established conclusions of physiology on the subject of sensation are applicable, if not to the solution, at least to the more clear statement and apprehension, of the great problems which lie still unsolved at the very threshold of metaphysics. Of this character are the ques-

¹ Reid's Writings, with Hamilton's "Notes," p. 268.

tions regarding the origin of our notion of space, of motion, of the external, of substance, &c.

The physiological facts or conclusions applicable to such questions may be stated in the following terms: that every sentient nervous filament is an independent instrument of sensation, and that every sensation involves an element of space, namely the point of space where the organic change produced by the impression originates, that is, at the peripheral extremity of the nervous filament concerned.¹ Sir William Hamilton—one of the metaphysicians who in our time has most clearly perceived the advantages of conjoining physiological with metaphysical investigation—refers to this law of sensation in the following terms: “The physiological law is, that a nervous point yields a sensation, felt as locally distinct, in proportion as it is isolated in its action from every other.”²

The question, then, arises—Does it not follow from this law, even as stated by this distinguished metaphysician, that the infant in no long time after birth must come to recognise the relative position of all the sentient points in the space occupied by the skin and the muscular system; and therefore that it must then become cognisant of the space as a whole in which these two systems exist—that is to say, must become cognisant of the chief part of the form of its body. By the affirmation of this question, all that can be signified is that the infant, being by its original mental constitution susceptible of the notion of space, thus realizes that notion in its first rudimentary form. It must be admitted, moreover, that such a rudimentary notion of space is as yet purely subjective, that is, a state of the conscious self and not yet regarded as something separate from the thinking being. Metaphysicians are accustomed to say that the notion of space is a necessary condition of human thought. This is the same kind of proposition as that made by physiologists when they say, the germ at the time of conception is endowed with susceptibilities which represent all the realities which it is to exhibit up to the moment of its extinction by death. It is doubtless quite correct so to speak; but in philosophy, as in physiology, what we inquire into is not the existence of preliminary conditions or susceptibilities, but the occasions when susceptibilities are realized. If we wish to explain the nature of memory, it is not enough to say that man remembers because he has a susceptibility of memory, any more

¹ Report of the British Association for 1850. Transactions of Sections, p. 135.

² Reid's Writings, with Hamilton's Notes, p. 862.

than it is knowledge to say that opium procures sleep—"quia habet vim dormitivam." It belongs, then, to metaphysicians and physiologists to determine if the first sensations of the infant, as explained above, be sufficient to suggest to its mind a rudimentary notion of space, and not to rest satisfied with the proposition that the notion of space is an essential condition of human thought. The law of sensation, as above proposed, should be supplemented by the statement, that when an impression extends over the extremities of a number of adjacent nervous filaments, there is an obvious tendency in the mind to regard the resulting compound sensation as possessed of a unity of character; and this seems to be the effect of what physiologists have termed the radiation of sensation¹—the nervous influence generated at the central extremity of each sentient nervous filament, particularly when the impression is strong, flowing over, so to speak, reciprocally on the several filaments concerned. This same radiation of sensation is the physiological explanation of what Sir William Hamilton has pointed out as a law of sensation in relation to perception, "that above a certain point the stronger the sensation, the weaker the perception; and the distincter the perception, the less obtrusive the sensation."² For if the impression made on the peripheral extremities of certain nerves be unusually vehement, then the nervous influence generated at their central extremities in the nervous centre extends beyond its proper limits, and confuses the effect at their peripheral extremities.

Metaphysicians have never been able to explain the origin of the notion of motion. Now physiology teaches that man is conscious of every degree of contraction of the muscles of locomotion, as well of those contractions which so freely take place automatically in the infant before volition is established, as of those which volition subsequently directs. A remarkable illustration of the subjective knowledge which man possesses throughout life of the actual state of his muscular system is, that, in the dark he knows the exact attitude of his body; that without the necessity for any examination, the moment the attention is directed to this matter, he is at once aware in the darkest room in what particular position he stands, sits or lies. This knowledge of the muscular system implies that each fibre or set of fibres in a locomotive muscle communicates with the nervous centre by means of a sentient nerve. If, then, the law of sensation above stated be applied here, it is manifest that the local seat of the sensation be-

¹ See Müller's *Physiology*, by Baly, p. 697.

² *Ib.* p. 880.

longing to each muscular sentient filament will change its place during the contraction of the fibre or set of fibres to which it belongs,—so that the curious inquiry arises, whether the consciousness of the change of the sensation in its seat, during the contraction of such muscular fibres, be not the condition on which the rudimentary notion of motion first arises in the mind of the infant. The tendency of the simple sensations to combine into one compound sensation, representing by unity the entire contraction of a large muscle or set of muscles, may gradually extend the first rudimentary notion so as to render the transition easy to the movement of the members on the body by means of the joints. But this question is far from being as yet in a state for solution within our limits.

The metaphysician will be apt to tell us here, that even if the infant, by an original law of its mental constitution, can distinguish one sensation from another by their difference of local seat, or can even distinguish the form of space occupied by one muscle from that occupied by another, through the aggregate of the sensations arising during the contraction of each, that it will not, therefore, know either of these forms of space otherwise than subjectively, that is, as so many states of self. He will insist, therefore, that the physiological mode of inference from sensation does not solve the great difficulty of metaphysics which is, how the mind, which originally views all the phenomena of consciousness as subjective, or as so many states of self, comes at last to view a certain portion of these phenomena as objective, some, namely, as parts of its own body, and others as things without. To which the physiologist may answer, that he admits the difficulty—for that it does not yet appear on what particular condition the infant, even after it is already subjectively acquainted with every one of its parts and members, comes to know these in an objective sense—that is, how, when with the hand it touches the thigh, it comes to discover through the hand that the thigh is touched, and through the thigh that the hand is in the act of touching it.

In short, as yet the infant's view only represents the place of the hand, when impressions are made on it, as known through the aggregate of the minute sensible areas occupied by the peripheral extremities of the sentient nerves, in which, owing to the impressions made, consciousness has arisen, and the place of the thigh as known, when impressions are made upon it, through the minute sensible areas on which consciousness has there simultaneously arisen. But our physio-

logist may, nevertheless, maintain that by his mode of investigation some advantages, and those, too, of a metaphysical kind, may be obtained, and that even if it be impossible to discover the precise mode in which the phenomena of consciousness representing in the mind of the infant the parts of its own body and things without, pass from a subjective to an objective character, yet that the nature of the difficulty may become more apparent, and its character and real importance more easily apprehended by mankind at large.

But, in truth, it does not seem a wholly hopeless task to attempt to trace out the condition or conditions on which the kind of knowledge here referred to may pass from a subjective to an objective form. The infant, pure idealist as it is assumed to be previously to this change, is nevertheless as well acquainted with the properties of the matter of its own body, and of the external things with which it has come into contact, as any octogenarian follower of Pyrrho ever could be. It must already be familiar with the distinction of what are always to remain purely mental phenomena, into subjective and objective ; for, though the act of memory is always subjective, the sweets of yesterday which it remembers, are surely objective. After this stage, how easy is it to conceive that there may be some simple train of thought determined by which the infant shall recognise the identity, as seen with the eye, of that same hand which as yet it has known only through the nerves with which the hand is supplied, and the difficulty vanishes.

If, however, the infant has succeeded in reaching the objective aspect of its own body, it is already far advanced in the study of matter, and the notion of the external will no longer present any difficulty, since whatever it touches which is not a part of self, affords but one sensation, while, in every case in which a part of self is touched by another part of self, two simultaneous sensations arise, each having its local seat in one of the parts which have come into contact.

Did our limits permit, it would be easy on the supposition that the great difficulty involved in the transition from the mere subjective knowledge of the bodily frame to an objective knowledge of it, were overcome, to trace out, on a like plan, a very complete system of physiological psychology. But it is high time we had devoted more of our attention to the little work which has given occasion to these observations.

Our readers will readily obtain a just idea of the character and style of this little work by such a quotation as the fol-

lowing from the second dialogue, headed "Mind and Matter:"—

"I never," said Eubulus, "find myself left to my own contemplations in a situation such as this without a feeling of wonder at myself and my own existence. Here am I, I mean I, who feel and think, pent up within the narrow dwelling of my own body, yet taking cognizance of things remote in space, not only of those which belong to our own world, but of those in the vast universe around us. Marvellous as this may be, let us wait but for a few hours, and we have what is still more marvellous. By the aid of a tube and a few glasses, I may become acquainted with other objects, suns and worlds, distant from us not only in space, but also in time, which I see not as they now are, but as they were many thousands of years before I myself was in existence. I do not say that such reflections prove more than may be proved in other ways, but they certainly impress my mind more strongly with the conviction that, as a percipient, conscious, and intelligent being, I belong to a mode of existence wholly different from that of the senseless bodies by which I am surrounded, and that (even independently of the evidence afforded by revelation) there is nothing unreasonable in the universal expectation of mankind (so universal, indeed, as to have almost the character of an instinct) that there is something in us which will remain, and be capable of perception and thought, and it may be of pure and high aspirations, when the gross material fabric with which it is now associated has become resolved into its original elements."

"CRITES. I can perfectly enter into the sentiments which you have now expressed. The properties of mind are so wholly different from those of matter, the two are so completely asunder, that they do not admit even of the most distant comparison with each other. I can easily imagine that motion, gravitation, heat, light, electricity, magnetism, chemical attraction, have something in common; that they are (as, indeed, Mr Grove has shown them to be) so far of the same essence as to be convertible into each other; but it is to me wholly inconceivable that any exaltation of the known properties of matter should produce the one conscious indivisible being which I feel myself to be. When the materialist argues that we know nothing of mind except as being dependent on material organization, I turn his argument against himself, and say that the existence of my own mind is the only thing of which I have any actual and indubitable knowledge. I cannot help believing in the existence of an external world. Still the hypothesis of its non-existence implies no contradiction, whereas it is as much a contradiction to doubt the existence of my own mind as it would be to doubt that two and two are equal to four. You must excuse me, however, if I say that it occurred to me yesterday (though I did not notice it at the time) that in one of your remarks, you seemed to identify the functions of the mind with those of the body more than you are disposed to identify them at present. I allude to the comparison which you made of the effect produced by long-continued voluntary effort in the maintenance of muscular contraction, and in the operations of the intellect.

"EUBULUS. When we say that we believe in the independent

existence of the percipient and thinking principle. I apprehend that neither you nor I can mean to deny the obvious fact of it having a connection with our bodily organs, by means of which it receives impressions from without, and operates in return on bodies external to itself. This, however, is not peculiar to such humble beings as ourselves. When I contemplate the evidence of intention and design which present themselves everywhere around us, but which, to our limited comprehensions, is more especially manifested in the vegetable and animal creations, I cannot avoid attributing the organization of the universe to an intelligent being, whose power and knowledge are such that it is impossible for me to form any adequate conception of them, any more than I can avoid referring the motions of the planets and stars to the same law of gravitation as that which directs the motions of our own globe. But no one, I apprehend, will maintain that the mind of the Deity depends on a certain construction of brain and nerves; and Dr Priestley, the most philosophical of the advocates of the system of materialism, ventures no further than to say that we have no knowledge on the subject. But, to use the words of Sir Isaac Newton, 'This powerful ever-living agent being in all places, is more able to move the bodies within his boundless uniform sensorium, and thereby to form and reform the parts of the universe, than we are, by our will, to move the parts of our own bodies.' The remainder of the passage from which I have made this quotation, is not without interest, as indicating the view which Newton took of the matter in question:—'And yet we are not to consider the world as the body of God, or the several parts thereof as the parts of God. He is an uniform being, void of organs, members, or parts, and they are his creatures, subordinate to him and subservient to him, and he is no more the soul of them than the soul of man is the soul of the species carried through the organs of sense into the place of its sensation, where it perceives them by its immediate presence, without the intervention of any third thing. The organs of sense are not for enabling the soul to perceive the species of things in its sensorium, but only for conveying them thither; and God has no need of any such organs, he being everywhere present to the things themselves.'

"**ERGATES.** I can perfectly well conceive the existence of mind independently of corporeal organs; but our actual experience of it is only under the last-mentioned condition; and in no other way can it be the proper object of study. It seems to me that the best writers on the philosophy of the mind have erred in considering the mind too abstractedly, not taking sufficiently into the account the physical influences to which it is subjected.

"**EUBULUS.** There are, however, those who form an exception to this rule; for example, Descartes, Hartley, and that universal genius, Dr Hook. Moreover, Dr Reid's inquiry into the human mind is founded on a critical examination of the several senses; and Dr Berkley's essay on the corporeal function of vision contains the germ of all his metaphysical investigations.

CRITES. The two latter were certainly anything but materialists. The others to whom you allude have been guilty of an error the very opposite to that which I have mentioned, giving as an explanation of mental phenomena that which not only has no foundation in observa-

tion and experience, but which is, indeed, no explanation at all. When I learn from Hartley that thought is a vibration of the fibres of the brain; and from Hook, that there is a matter in the brain intended to receive the impressions of sound, which may be compared to the bells and vases which Vitruvius describes as being placed in the ancient theatres; and that thinking is the radiation of the soul from one part of the brain to another, I do not find myself to be a whit wiser than I was before.

“EUBULUS. That may be true. But when Hook states that there are various structures in the brain adapting it for the part which it has to perform in connection with the mental principle,—that there is an organ of memory, for example—I find so many facts which are favourable to this opinion, that I cannot but regard it as more than a mere hypothesis. As to this point, however, Ergates has had greater opportunities than I have had of obtaining information; and I should be well pleased to hear what he has to say on the subject.

“ERGATES. If I comply with your wishes, I must make some small demand on your patience, as, although what I have to say may not be much in substance, it cannot be compressed into a very few words.”—(Pp. 35–42.)

The remainder of the dialogue contains an account of the brain represented as a congeries of organs, each possessed of a separate endowment, while these several endowments concur to one purpose; a notice of the physiological researches of Magendie and Flourens indicating, for example, that the cerebellum has for one of its offices to combine the action of the voluntary muscles for the purpose of locomotion, that the vision of each eye depends on the integrity of the opposite upper tubercle in the *corpora quadrigemina*, and that respiration and instinctive actions can only be performed while the *medulla oblongata* is entire; observations on the connection between peculiarities in the propensities and characters of individuals and slight differences in the physical organization of their nervous systems; a discussion of the question, is there an organ of speech in the nervous system, and the commencement of a conversation on memory, which is continued into the next dialogue. In support of the idea that there is in the nervous system an organ of speech, Ergates (who speaks the author's sentiments) refers to two cases which had fallen within his own knowledge of defect of speech in young persons whose hearing and mental faculties in general were complete. One of these cases was that of a boy only five years old when Sir Benjamin first saw him, but at the age of thirteen he had heard of him as still unable to speak, though he wrote beautifully, and was clever in arithmetic; the other was that of a girl eleven years old, who, though she could not speak, could, when desired, readily point out the letters of the alphabet in a book she had never seen before.

These are very interesting cases, and imply at least a defect or derangement of the nerves supplying the organs of articulation; they correspond to the dumbness which has sometimes arisen from the effects of lesion of parts by accidents or otherwise. We hardly think, however, they warrant any conclusion in favour of a special organ in the nervous system for articulation. Articulation, doubtless, implies the concurrent contractions of numerous muscles in almost endless combinations: but speech is acquired by long continued efforts, much in the same way as other complex muscular exertions; for example, the ready command of an accomplished performer on the piano over the movements of his fingers. The acquisition of articulate speech is, however, one of the most surprising of all man's attainments in the combination of complex muscular movements. It is manifestly the result of imitation, but of an imitation in which the eye affords little or none of that assistance so fully afforded in most other cases of acquisition in that manner. The child hears a sound and attempts to imitate it; a rude resemblance to the sound is at last produced, and a perfect imitation is perhaps not attained for years. Were the attempt at articulation instinctive, the resemblance would be complete at the first trials. It is an exercise of volition; but what is the condition on which volition succeeds? Physiology seems already to point certainly to the condition—namely, when the individual already has been conscious of the suite of sensations accompanying the contraction of a combination of muscles, and can recall the remembrance of that consciousness, then volition suffices for its repetition—that is, the remembrance of the sensation accompanying the contraction of a muscle or set of muscles is the condition on which volition can reproduce it. If the ordinary skeleton muscles never contracted except in obedience to volition this condition would be unattainable; but nothing is more certain than that every muscle in the body must have many times contracted, in numerous combinations, automatically—that is, independently of volition, long before the age at which articulate speech begins, and that the sensations attendant on their contractions must have been simultaneously impressed on the memory of the child. The efforts at articulation, then, in a child consist of attempts to throw the muscles concerned into various combinations by the remembrance of the sensations which had accompanied their previously observed contractions; and when, by a happy hit, the just combination is made, the remembrance of the corresponding compound sensation will secure its repetition under the act of volition. The awkward movements made at first

by a dancer or a skater to hit the model acts are plainly efforts used to remember the sensations which accompanied their previous nearest approaches to the required combinations.

The conversation on memory leads to the suggestion of ideas by internal causes acting on the brain, by the nerves or through the medium of the blood, and to the striking examples which dreams afford of such influences, and from dreams there is a natural transition to phantoms. Under the head of phantoms, and false perceptions simulating realities, numerous interesting cases are mentioned, some of them new, others well known to those versed in the literature of the supernatural. Such subjects are naturally followed by a discourse on mental derangement, of which, as we might expect, a brief yet just view is taken. We can afford room only for the following short passage, in which an important discussion on criminal responsibility of the insane is summed up:—

“EUBULUS.—Believing as I do, with Crites, that the subject which you are now discussing is one of great importance as it affects society at large, I have listened with much interest to the observations which you have made. You, Crites, have pointed out the necessity of not confounding, as has been sometimes done, mischievous or absurd propensities, however strong, with actual insanity. You, Ergates, have endeavoured to show that there is no broad line, by which the former can always be distinguished from the latter; and I am inclined to agree with both of you. But I also cannot but assent to the opinion of Crites, when he farther stated that the existence of illusions is not in every instance to be regarded as justifying the plea of want of responsibility. Allow me to add, that it is a very great mistake to suppose that this is a question which can be determined only by medical practitioners; any one of plain common sense, who will give it due consideration, is competent to form an opinion on it, and it belongs fully as much to those whose office it is to administer the law as it does to the medical profession.”—(Pp. 103, 104.)

In the fourth Dialogue the subject of dreams is again renewed, and much interesting discussion takes place, for which, however, we must refer our readers to the work itself; but we shall extract the conclusion of this Dialogue, premising that throughout the conversation runs on the functions of the brain:—

“CRITES. Before our conversation for this day is concluded, there is one other inquiry which I would make of Ergates. Believing, as I do, that the percipient, conscious, and intelligent mind belongs to a mode of existence wholly different from that of the senseless bodies by which we are surrounded, still I cannot but admit that there must be certain changes taking place in the nervous system in connection

with mental processes, some of these being transient in their nature, while others are so far permanent that they may not be effaced during the longest life. Now, with regard to these changes, Ergates has stated that 'their exact nature is a mystery which we have no means of unravelling, and that this is a kind of knowledge as much beyond our reach as that of the structure of the sun, or of the central parts of the earth.' Not disputing the correctness of this statement, yet I see no reason why we might not be able to form some general notion on the subject, and the following questions naturally present themselves to us. Are the changes which the nervous system undergoes simply mechanical? or are they of the same kind as those chemical changes which take place in inorganic matter? or do they rather belong to that class of phenomena which we refer to imponderable agents, such as electricity and magnetism, by virtue of which a piece of sealing-wax rubbed with a silk handkerchief draws light bodies to itself, or a bar of iron becomes endued with the attractive property of a magnet.

ERGATES. Although these subjects have not been hitherto formally discussed, still you may on some points anticipate my answer from observations which I have already made incidentally.

The very little that we actually know may be comprised in a few words.

1. The transmission of impressions from one part of the nervous system to another, or from the nervous system to the muscular and glandular structures, has a nearer resemblance to the effects produced by the imponderable agents to which you have alluded than to anything else. It seems very probable, indeed, that the nervous force is some modification of that force, which produces the phenomena of electricity and magnetism; and you may recollect that I have already ventured to compare the generation of it by the action of the oxygenised blood on the grey substance of the brain and spinal chord, to the production of the electric force by the action of the acid solution on the metallic plates in the cells of a voltaic battery.

2. We know that the solid parts of the body are in a state of perpetual change. There is a constant influx of new materials supplied by the digestive organs, and in other ways, and a corresponding efflux of the old materials by means of the various excretions, especially by that of the kidneys. The brain itself forms no exception to the general rule. We cannot otherwise account for its growth in the early part of life, nor for the alterations in its structure which arise as the consequence of disease, nor for those other changes which occur in extreme old age. The molecules of the brain in a man of twenty years of age are not the same with those which formed the brain of the same individual when he was ten years old, nor with those of which it will be composed when he arrives at the age of fifty years. The mind preserves its identity, but there is no corresponding identity of the corporeal organ with which it is associated; and we may even venture to assert that the brain of to-day is not precisely and in all respects the same with the brain of yesterday, and that it will not be the brain of to-morrow.

3. We cannot suppose that such deposition of new materials and

abstraction of old ones can be effected by mere mechanical means, as you would take one brick from a building and substitute another in its place. The elements of which the nervous system is composed exist in the blood, but they must undergo a new chemical combination before they can be incorporated with it ; and in like manner they must undergo a chemical change of an opposite kind before they can re-enter the current of the circulation. The precise character of these chemical changes we have no means of ascertaining ; but whatever it may be, there is reason to believe, that, in proportion as the nervous system is more or less exercised, whether it be in connection with mere corporeal functions, or with mental processes, so do they take place to a greater or less extent. As relating to this subject, it may be observed that the nervous substance is distinguished from all the other tissues (with the exception of the bones) by the very large proportion of phosphorus which enters into its composition, amounting to 1.5 parts in 100, and to as much as one-thirteenth of the solid matter which remains after the evaporation of the water ; and that one result of over-exercise of the nervous system is the elimination of an unusual quantity of salts containing phosphorus by means of the secretion of the kidneys. This fact was first observed by Dr Prout, who has given it as his opinion 'that the phosphorus in organised beings is in some measure connected with nervous tissues and nervous action,' and who in another place refers to 'severe and protracted debilitating passions and excessive fatigue, as the general exciting causes of' what he terms, 'the phosphatic diathesis.'

4. With regard to those more permanent changes in the brain to which Crites has referred as connected with the memory, and what is called the association of ideas, and I may add, with mental habits and dispositions as far as these are dependent on our physical organization, I have nothing to offer beyond what I have expressed already. There is, I apprehend, sufficient evidence that such changes do certainly take place ; but as to their real nature, we not only know nothing, but have no means of obtaining any actual knowledge. The improved microscope of the present day has enabled us to unravel to a considerable extent the minuter tissues of the animal body ; but nevertheless, in pursuing an inquiry such as this, it affords us no assistance. There can be no doubt that there is as much in the animal structures beyond the reach of the microscope, as there is in the vast universe around us beyond the reach of the telescope ; so that, whatever we might thus discover, we may be sure that there is something further still. But let us suppose that it were otherwise, and (assuming the molecular hypothesis to be true) that with more perfect organs of sense, or more perfect instruments, we could trace exactly the changes which take place in the arrangement or aggregation of the ultimate molecules of the brain, I do not see that we should be much advanced in knowledge. The link between the physical and mental phenomena would still be wanting, and it would be as idle to speculate on the nature of the relation between mind and matter, as on the proximate cause of gravitation, or of magnetic attraction and repulsion."—(Pp. 154-160.)

The fifth Dialogue enters on the mental faculties of animals, and the various forms of instinct. On these subjects many most interesting observations are made, which we regret we cannot present to our readers. We shall quote, however, the concluding paragraphs of this Dialogue, in which reference is made to principles analogous to instincts in the constitution of the human mind :—

“Nor must we omit the operation of another cause which mainly contributes to the attainment of that higher degree of civilization in which the sentiment of duty prevails over the more selfish appetites. The disposition of man, even in his most degraded state, to believe in supernatural agencies, is so universal, and so manifestly the result of his peculiar constitution, that we must regard it as having very much of the character of an instinct. As he advances in knowledge, and has leisure for observation and reflection, the perception of the beauty, grandeur, and harmony of the universe, of the evidence of intention and design, and of the adaptation of means to ends in everything around him, and of the large amount of good with the small proportion of evil, which is manifested in the condition of all living creatures, leads him to the knowledge of an intelligent and beneficent Creator, to whom he *may* at any rate be responsible for the right use of the faculties with which he is endowed; and thus the religious sentiment becomes engrafted on the rude instinct of the savage. Thus, man as he exists under the best form of civilization, is made what he is by the operation of various causes. There are his original instincts, without which he could no more have continued to exist than without the action of the heart. There are habits, which, begun in one, and continued in subsequent generations, become confirmed in him, and bear a close resemblance to instincts. These modify and correct each other, and they are all, in a greater or less degree, under the dominion of the intellect. Such is the general view which we must take of his condition; but if we attempt to make a more exact analysis of it, we find the problem too complicated for a satisfactory solution,—the various influences to which he is subject being so intermixed with each other, that it is impossible for us to determine in each particular instance how much of his sentiments and conduct is to be attributed to one of them, and how much to another.

“CRITES.—You have referred to the disposition of human beings to believe in supernatural agencies as partaking of the character of instincts. If you are correct in so doing, it seems to me that you may with equal reason include in the same category our belief in the existence of a material world; our belief that what we remember as having happened, happened in reality; in short, in all that some have intended to describe under the name of innate ideas; and that Buffier, and Reid after him, regarded as primary and fundamental truths; the knowledge of which is forced upon us by our own constitution, and is independent of experience and reasoning. Now, although I do not admit the exactness of the catalogue of these primary

truths, which has been furnished to us by the writers whom I have mentioned, and indeed do not doubt that they have included in it some kinds of knowledge which are derived from other sources, yet I do not dispute the correctness of their general views; and indeed it is plain that it has been practically admitted by even the most sceptical of those philosophers who have written on the subject. But are we really justified in regarding such kinds of belief as being of the nature of instinct?

“EUBULUS.—They differ from them in one very essential circumstance. It has been shown that instincts are far from being constant and immutable; as under a change of circumstances certain instincts are lost, so are others generated. Even those which are of the greatest necessity, which seem to be the most constant, may, under certain circumstances, be found to be wanting in an individual on whom they had been fully developed previously. But it is otherwise with those articles of primary belief which are represented as the foundation of all our knowledge. However strange may be the illusions of the lunatic, or however convincing the arguments of the metaphysician, neither the one nor the other can escape from the belief that there is an external world independent of himself, or that what he remembers to have happened did actually occur. Taking these things into consideration, it seems not unreasonable to suppose that this class of convictions has some higher source than that which belongs to mere instincts, and that they are actually inherent in the mental principle itself, and independent of our physical organization.”—(Pp. 204–208.)

We wish our author had afforded some further insight into his sentiments on the subject of the primary and fundamental truths to which he has referred, as enumerated (he says) by Buffier and Reid. Distinct notions on these primary and fundamental truths are of vast importance towards just views in philosophy at large, and were never more necessary than at the present moment, when what is called positive philosophy is striving to throw down all that is most noble in the edifice of human knowledge. Some of these fundamental truths cannot be called in question, because their opposites involve a contradiction; but there are other fundamental truths, just as firmly impressed on the human mind as the necessary truths above referred to, the opposites of which, or greater or less deviations from them, do not involve a contradiction, as in the case of necessary truths. Of such truths, which some have termed natural fundamental truths, the most important are the belief in an external world, and in the free agency of self, the belief that every event has a cause, and that there is an exercise of power whenever an event takes place; for by reasoning from these last truths, the existence of an omnipotent Cause is obtained. We wish Sir Benjamin had given us his sentiments on the question so fiercely agitated among psychologists, How far man's idea

of power is derived from the volition which he constantly exercises in the production of muscular movements; and whether the proper mode of stating this point is to say that man derives his notion of power from volition, or that his notion of power or cause is intuitive, and that the exercise of volition is merely one of the occasions on which the notion of power or cause is brought home to his mind?

The last dialogue discusses views of human nature, touches on phrenology, on the causes influencing men's characters, on the mind in old age, on Adam Smith's theory of sympathy, and on self-knowledge, duties, and responsibilities. We quote the concluding paragraphs—

“CRITES. You may add, that whoever would understand the minds of others, and exercise an useful influence over them, must first understand himself. He who forms a wrong estimate of his own capabilities, of his own prejudices, and of the weak points of his own character, measures the characters of others by an erroneous standard. Not only is he in constant danger of undertaking that which he is not qualified, and of neglecting that which he is qualified, to perform, but he is at the mercy of others, who, although they may very probably be inferior to himself in some of the nobler qualities, obtain a dominion over him by studying his defects, and making them subservient to their private purposes.

“EUBULUS. Whatever they may have been otherwise, the priests of the Delphic Oracle were certainly no impostors when they displayed that simple but significant inscription ‘Γνωθι σεαυτον’ over the portico of the temple of the heathen god. If self-knowledge be important as the first step towards a knowledge of the characters of others, on other grounds it is more important still. Though we may admit, with Er-gates, that the mental principle must be of the same essence, under whatever form it exists, still there can be no question as to the vast superiority of the mind of man to that of all the created beings by whom he is surrounded. But in what does that superiority consist? Other animals, and more especially the gregarious, are not without an ample share of the moral sentiments. We see them displayed in the dog, who rejoices in being your companion, who flies to your assistance if you are attacked; in the attachment of the elephant to his keeper who treats him kindly, and in his resentment of injuries; in the roebuck, who pines and dies if separated from his mate; and even in the cat, who, peaceful at other times, turns round on you in anger if you interfere with her kitten. It is not as to these, but as to his intellectual faculties, that there is so vast a difference between man and other animals, that none can be said even to approach him in this respect. But this distinction is not without its price. It imposes on him duties of a higher order, and greater responsibilities. He is required not to yield to the impulse of the moment, but to look to the more remote consequences of what he says and does; and to keep not only his instincts and passions, but even his thoughts, in

subjection to his will. Nor can this be rightly accomplished by any one who does not regard his own powers, his own disposition, and his peculiar moral temperament, influenced as it is by his physical condition and his mode of life, as a fit object of study, even more than anything external to himself. This brings us to other inquiries of the highest interest, involving as they do so much of what is of the greatest importance to ourselves and others; inquiries which have not been neglected by heathen philosophers, but which assume a more exalted character when pursued by those who, guided by the light of revelation, feel that they are answerable to an almighty power for the right use of the faculties with which they are endowed. But on these we have no leisure to enter at present. Whatever may be the value of our discussions, from the arrangements which you, my friends, have made, we must consider them as terminated.

“ ‘*Quæ cum essent dicta, finem fecimus et ambulandi et disputandi.*’ ”
—(Pp. 240–243.)

The volume closes with some excellent explanatory notes.

We have thus endeavoured to present to our readers some idea of the contents of Sir Benjamin's work, and we trust we have said enough to induce those who have leisure to read the book itself. Though entitled *Psychological Inquiries*, the book is sufficiently light and agreeable reading. Indeed, we wish it had been more of a psychological work, though that could not have been without entailing upon the reader a far more laborious task. The general reader need not fear to engage in the perusal of this book; even in its most profound disquisitions it does not task his attention very severely, and the fatigue of reading abstract propositions is carefully relieved by occasional gentle flights of fancy.

ART. III.—*The Elements of Materia Medica and Therapeutics.* By J. PEREIRA, M.D. Third Edition. Vol. II., Part II.

As long as medicine is an art, so long will the works of Claudius Galen, the last, and perhaps the greatest, of the Hippocratican school, be valuable. For the truth is, that almost all our clinical observations and facts are contained in them; and that for the last sixteen centuries we have added very little to the stock of observed occurrences in disease. Even, too, as long as medicine is cultivated as a science, we may perhaps be the better of Galen. His hypotheses, perhaps, if we could rightly dress them in language,