

Consciousness and "Unconscious Cerebration."—By the Rev. W. G. DAVIES, B.D., Chaplain J. C. Asylum, Abergavenny.

Is consciousness something distinct from the intellectual operations named perceiving, conceiving, reasoning, recollecting, imagining; or do these operations ever take place in the absence of consciousness? In order to answer this vital question it is necessary that consciousness should be examined with a microscopic nicety, rarely, as we take it, attained to since Reid explored this field of science. When we consider that, for forty years, Reid, with an enthusiastic admiration for that inductive method which the genius of Newton and others illuminated with such brilliancy, questioned Nature, Nature in man, as to the character of perception, and decided that the objects disclosed by it were not mentally possessed; investigators are bound, for their own credit's sake, to show beyond doubt that Reid is in error before they flippantly accuse him of being singularly wanting in penetration. Yet the conclusion which is forced upon us by the present aspect of psychology and cerebral physiology, not to mention metaphysic, is to the effect either that Reid was singularly wanting in analytical ability, or that the living race of psychologists must be going far astray on a most vital point. We have lately been forced to believe that Reid is on the right road; yet, sooth to say, during many years objects have been to us, as it would seem to psychologists in general, a most fertile source of perplexity and confusion. It is only very lately we have succeeded in realising the fact that the object, or the known, is not an element of the knowing; that knowing is not knowing *plus* known, but knowing purely and simply, a single fact, not a double one; not a synthesis of consciousness and object, but consciousness only, that and nothing more.

To Reid must be awarded the honour of seeing more clearly than any other enquirer this all-important fact of psychology. Hamilton, although deeply in sympathy with Reid in most respects, thought nevertheless that he went too far in shutting objects out of the mind. In opposition to Hamilton, we feel convinced that no system, either of psychology or of cerebral physiology, can be built on an intelligible and abiding basis till it is unreservedly acknowledged that

knowing, in no instance, includes the known as an essential part of itself. We go even farther than Reid in this respect, for he is evidently at fault, and is holding a doctrine inconsistent with his main one, that knowing does not embrace the known, when he states that consciousness is a special operation of the mind revealing to us such mental acts as perception, reasoning, and the rest, as if these were objects known. Consciousness we hold, in common with the more recent psychologists, to be a general term embracing the various kinds of knowing, but—and in this we differ widely from them—never constituting the object or known.*

What is knowing? Before replying to this question, we must be made well aware that knowing is for us, as intelligences, the Beginning, it underlies everything, our own existence; all other existence. It is impossible, therefore, to analyse it into simpler elements, for it is itself the simple, the absolute starting point; it cannot consequently be defined. Bearing this much well in mind, let it be understood that when we say knowing is this or that, a revelation, for instance, we are only substituting one equivalent term for another, and saying, in effect, that knowing is knowing. This is all then we profess to do in stating that knowing is a revelation. As such, it reveals itself, and this is absolutely essential to its revealing aught else. But mark! when it reveals other things, it does not put us mentally in possession of these other things; for, in such act of knowing, we are made mental proprietors of absolutely nothing but the knowing. For instance, one kind of knowing discloses to us the existence of the non-ego, but we are entirely restricted to the disclosure; the non-ego revealed forms no part whatever of the furniture of the revealing mind. Were it asked how could the moon be made to exist to the earth, the answer must be, the earth must be endowed with an intelligence that would enable it to be conscious of the existence of the moon. Now the earth, in such a case, would possess nothing more than the consciousness of the moon's existence; it would not, in addition to this, also possess the object known, or the moon.

Then, with regard to these intellectual operations, if we are

* Of course, knowing reveals itself to itself, which is to say, it knows itself, and thus may be thought to be an object to itself. We do not deny this. What we deny is that the object when revealed as *not-knowing* is, nevertheless, knowing. To hold this is to give the lie to the only foundation of certitude—knowing, in its very final revealing, as the underlying fact of all facts.

conscious of them as objects to be distinguished from the consciousness, it must, nevertheless, be admitted that they exist *ad nos* only through the knowing of them, and that knowing is nothing but knowing. But does consciousness reveal the independent existence of these intellectual operations; and is not consciousness veracious in what it reveals?

First, does consciousness reveal the independent existence of these intellectual operations? It seems to us as clear as noon-day that it does not. Knowing, consciousness, only exists in the various forms called perception (intellection *plus* sensation), conception, reasoning, recollecting, imagining, &c. Consciousness is the general designation for all these kinds of knowing, the class of which they form the divisions. Knowing of any kind, being a revelation, must have form, shape, or quality in which to reveal itself. It is simply impossible for us to have consciousness denuded of all quality. These intellectual operations are therefore the different modes in which consciousness exists for us.

This investigation here enters upon a stage which renders it necessary to discriminate between Mind-conscious and Mind-unconscious. Both states of mind only exist for us in so far as they are *known* to do so. But the one state, Mind-conscious, without consciousness, under its various forms of perception, conception, &c., is nothing. It exists only as knowing, and without knowing Mind-conscious exists not. The other state, Mind-unconscious, exists as the *known*, and is revealed by those branches of knowing named anatomy, physiology, &c. In fact, the one is the *knowing* Mind, the other the *known* Mind. A complete psychology consists of the facts of the *knowing* Mind, the facts of the *known* Mind, together with the inferences following from the comparing together of these two classes of facts. Now the intellectual operations above mentioned, we reiterate, are revealed as pertaining exclusively to Mind-conscious; and of the mere consciousness of such intellectual operations as conjectured to be distinguishable from the acts themselves we positively find no trace; it would be knowing stripped of all quality, which would render it completely unknowable. We feel compelled, then, to return to the question: Does knowing reveal the independent existence of the intellectual operations? a decisively negative answer.

Secondly, is knowing veracious in what it reveals? It must, on consideration, be very evident that unless there be radical veracity in knowing there can be no absolute truth,

no exact, no positive science. In ultimate analysis, even though we plunge deep as the nebulous or the atomic theory, we must confess that knowing is, of all facts, the underlying one. Deeper than knowing we cannot positively dive. And now the fundamental fact of knowing is this:—

Any attempt either to establish or to overthrow its veracity must take that veracity for granted. For the endeavour to establish it begs the very veracity it seeks to establish, and the endeavour to overthrow it, the veracity it seeks to overthrow. The integrity of consciousness, therefore, must be taken for granted in every *exhaustive* search after truth.

Now, as there can be no question that these intellectual operations are never revealed as separate from consciousness; and since, moreover, this revealing cannot be deemed mendacious without involving self-annihilating doubt, we have no alternative but to conclude that for each kind of knowing, perception (intellection *plus* sensation), reasoning, &c., there can be but one seat, that is, as we shall show more articulately in the sequel, the sensory ganglia for sensation, sense-consciousness; the cerebrum for intellectual consciousness or ideation.*

It is held by the majority of the later metaphysicians that what, in any case, is immediately known is a modification of consciousness, a mental object. In fact, the *tertium quid* of the older psychologists has been transformed into the *solum quid*; and by the more recent metaphysicians it is maintained that this has a distinguishable aspect in, but not a separable existence from, consciousness; that it is consciousness in its objective aspect. But consciousness thoroughly repudiates any such alliance between itself and the known. What consciousness clearly and emphatically declares is, that the object is never identical with itself, is never possessed by Mind-conscious at all. But even were the view here rejected correct, since the object is declared to be inseparable from the consciousness, there can be but one seat involved—not one for the knowing, another for the known.

Not long ago a work, entitled “Subject and Object as connected with our Double Brain,” was reviewed in this Journal; and in that work, the author, holding in its crudest form the opinion that there is a subject and an object in all thought,

* In an article in this Journal, July, 1869, entitled “The Perceptive Centres and their Localisation,” we have entered at some length into this subject. We wish it to be understood, however, that we desire certain points in that article to be modified in harmony with the later opinion entertained in this contribution.

attempts to make out that the right hemisphere of the brain is concerned with the former, the left with the latter; and that for the production of ideas, the two hemispheres have to act in union, the left being the seat of ideas regarded as objects, the right, the seat of the contemplation of these ideas. Here we have brought physiologically to an amusing climax that crude doctrine of the time of Berkeley, which supposes the separability of subject and object in thought. This author, however, is not the only one who has been led astray by the prevailing opinion as to the relation in which objects stand to knowing.

Dr. Carpenter, for instance, holding that the sensorium is the sole seat of consciousness, believes that ideation, the function of the grey matter of the cerebral hemispheres, is not a mode of consciousness at all, and that it habitually takes place without exciting a consciousness of it in the sensory ganglia below. He, too, then holds that there is one seat for the object, and another for the consciousness of the object. But, unfortunately for the success of his hypothesis, knowing, our only outlet to Being, knowing, for us, the Beginning, reveals that the consciousness, in this case, is all that exists; that "the intellectual operations" and "consciousness of the intellectual operations" are simply two names for one and the same thing.

To sum up this head: these intellectual operations only exist as certain kinds of knowing, and knowing is a single fact, not a double one; not knowing *plus* the known. This being the case, the effect of making the sensorium the seat of the consciousness of the intellectual operations is to make it the seat of these operations also, and thus to dispense with the functional action of the cerebral centres altogether, and to assign to these latter the humble office of merely exciting the sensorium to display thought and emotion. In short, the result of not seeing that knowing is nothing but knowing, not the known as well, is to obscure the whole field of psychology, and thereby so to mislead the anatomists as to make them hunt for the seat of a nonentity. When it is clearly understood that knowing cannot exist without quality, or as a bare contemplation of an object, but must present some form, as perception, reasoning, &c., there will be a better prospect than there has yet been of discovering the functions of the brain.

It is now time to ask, is knowing co-extensive with mind,

and are there not mental results invariably occurring without being attended with any display of knowing? According to the Law of Evolution, which we consider to be the highest utterance won from the oracle, knowing, in these days, Mind is the substratum of consciousness, Mind-unconscious precedes Mind-conscious; but what Mind is apart from nervous organization we know not, and have not the means of knowing. This, however, we do know, that to say Mind is matter is about as true as to say matter is Mind. Let us state the point in the following syllogistic form, and the absurdity of the charge brought by some well meaning persons, who have not given their whole time and attention to the subject, against those whose sole aim is the truth, becomes very apparent:—

Matter is the extended and solid,
Mind is matter—therefore
Mind is the extended and solid.

Who among the realists, or all save the idealists, hold an opinion in any way approaching to this? Mind, in that sense in which it is regarded as pre-consciously acting in Nature, is coeval with matter. Nature is not matter alone, not inert, dead, statical, matter, but matter endowed with Mind; matter being the inferior, subordinate, passive element; Mind being the superior, subordinating, active element. If the horse carries the rider, or the ship the mariner, yet it is the rider who guides the horse, the mariner the ship. In short, as it seems, the tendency of modern science, more especially physiological science, as Canon Kingsley has shown, is to return to an early spontaneous belief, and to look upon Nature as living, not dead; as in fact saturated with a forming, dominating Mind.

Although, then, Mind, as forming part of Nature, is not synonymous with consciousness, but is that, which, as certain grades of evolution are reached, displays sensational, intellectual, moral consciousness; still it never carries on the intellectual functions mentioned above without giving birth to consciousness. Dr. Carpenter thinks otherwise, and, among others, has won over to his own way of thinking, Dr. Bastian,* and Miss Francis Power Cobbe.

But, if we hold the opposite view, it becomes necessary that we should satisfactorily account for those mental results which

* "Consciousness," "Journal of Mental Science," January, 1870.

undeniably do take place without involving consciousness. In discussing this point we have decided upon selecting for criticism Miss Cobbe's fascinating exposition, in "Macmillan's Magazine," Nov., 1870, of Dr. Carpenter's doctrine.

Speaking of the "Unconscious Brain," Miss Cobbe remarks:—

"It not only remembers as much as the conscious self can recall, but often much more."

Memory, or the power of retaining so as again to reproduce past states of consciousness, is evidently a force-providing process. All mental activity leading to consciousness is the result of chemical reaction between the blood and the brain.*

But the mental activity which necessarily precedes this and provides for it, is of a different character. Between the two there is all the difference which exists between production and expenditure, between charging and discharging, the one is a nutritive, the other, a wasting activity. Now it is a law well known to physiologists, that when the discharging function of an organ has been carried on till the force is well spent, a cessation of such activity is needed, and that then the charging activity identically replaces what has been expended, but with a tendency, in a well practised, healthy organ, to enlarge its capacity for disintegrating action. Thus a large amount of latent thought, or thinking power, is continually being organized in the well trained brain ready, when a copious supply of good blood is at hand, to reveal itself when the demand is made upon it. Now to state, or even hint, that this *production* of mental power or latent memory is identical, in all save consciousness, with the *expenditure* of mental power or active memory is, we conceive, wholly unjustified by the facts of the case.

"It can understand (?) what words or things are sought to be remembered, and hunt them up through some recondite process known (?) only to itself, till it discovers and pounces on them."

As Dr. Carpenter bases his hypothesis mainly on the fact here stated, it will be well to yield to it a larger share of attention than to the rest of the operations credited by Miss

* Let it be understood that we incline to Dr. Frankland's theory rather than to Liebig's. We do not think that thought necessitates the oxidation of the Brain-cells, but simply their *activity*, which seems to involve the oxidation of the blood supplied to them. Of course we recognise the fact that the functional action of the Brain-cells occasions wear and tear, and that this must be repaired by the Nutritive process.

Cobbe to the "Unconscious Brain." With this intention, we shall give, as it appeared in the April number of "The Contemporary Review," Dr. Carpenter's latest version of his doctrine:—

"When a chain of association," he remarks, "has once been formed, the two Terminal Ideas may come into communication without the conscious intermediation of those which originally linked them together; so that the original chain having been composed of A B C D, A may *directly* excite D, without B and C coming into the mind at all."

Now it occurred to us to put this so-called fact to the test; but, before we state the result, let us settle the real meaning of the words "when a chain of associations has been formed." This is accomplished when, for instance, a piece of poetry has been completely committed to memory; we are then aware that number one link has called up number two, and so on throughout the whole length of the chain. But if a piece of poetry is not completely committed to memory, but is simply carefully perused twice or three times by a person possessing only an average memory, will the words and phrases that can be recalled retain the order in which they occur in the poem? With the object of discovering this point, we have selected for experiment a poem with which we have long been familiar, "The Charge of the Light Brigade," and having read it carefully through three times and then shut the book, we have written down the lines exactly in the order in which they occurred to our recollection. The following is the result:—"Forward the Light Brigade. O the wild charge they made. All the world wondered. Some one had blundered. Cannon to the right of them, Cannon to the left of them, Cannon in front of them, Volleyed and thundered. O the wild charge they made. Into the mouth of hell, rode the six hundred. When will their glory fade. Into the valley of death. Noble six hundred. Theirs but to do and die. Theirs not to reason why. Flashed all their sabres bare. Cannon behind them." Now, although we have often perused this poem, and carefully read it three times immediately before trying this experiment, yet the result, as will be readily seen from comparing it with the original, does not tally at all with Dr. Carpenter's statement. Let others try similar experiments, and we confidently expect that like results will follow. Evidently a perfect chain of association involves a completed process of retention; and a

completed process of retention is ready, at any time, to be recalled into consciousness.

When we are at a loss for a name and make every effort to recall it, but unsuccessfully; and that name afterwards spontaneously flashes into consciousness, such an event can be satisfactorily accounted for by the great physiological law of production to which reference has already been made. The disintegrating activity involved in hunting for the name has made an increased demand upon the nutritive process or production, extra force has been generated, this flashes out of latency into consciousness, and lo! the missing name. If "Unconscious Cerebration," in the sense of expenditure, is made to account for the fact that the schoolboy who can just manage with great effort to repeat fifty lines of Virgil before retiring to rest, can repeat them fluently in the morning, we are placed in this difficulty, namely, how to make a cask from which the water runs out as fast as it runs in, fuller in the morning than it was the previous night. So intelligent a man and so able a physiologist as Dr. Carpenter, must see the reasonableness of what we are here urging, if he has not done so already, only he is so hampered by an untenable hypothesis that he does not clearly state whether by "Unconscious Cerebration" he does not mean both integrating and disintegrating mental processes. Let him, therefore, ponder well over the fact that the integrating process is invariably preparatory to the display of consciousness, that the disintegrating process never takes place without such display.

"It can fancy the most beautiful pictures, and also the most terrible ones, and weave ten thousand fables with inexhaustible invention."

Miss Cobbe here alludes to dreaming, and dreaming, say what you will, involves consciousness, and consciousness involves a process of expenditure. Some parts of the brain being active, while others are dormant, the vagaries and delusions of dreams naturally follow. Were one to grind a barrel-organ, out of the barrel of which many of the projecting pieces had been removed, a result may be imagined not wholly wanting in analogy to what happens in dreaming.

"It can perform the exceedingly difficult task of mental arrangement and logical division of subjects."

This is evidently a process of production. That which is not, or is only imperfectly prepared for, in the brain, becomes massed *en force* after the plan traced by the prior discharging

process. How can dissipation of energy produce such a result?

“It can transact all the mechanical business of walking, reading, writing, sewing, playing, &c., &c.”

What can? “The Unconscious Brain.” The brain here must mean the motory ganglia, and these, it is well known, by long practice, get to perform such actions as the above without the continual superintendence of the higher centres which had to set them going, and continue directing them, till automatic proficiency had been attained. As the boy who was engaged to open and shut the valve of a steam-engine ingeniously contrived, when he wanted to play, to make a string perform the work, so the motory ganglia, when trained to do so, work away automatically with astonishing precision. But what have we here? not production but expenditure. The automatic actions of the motory apparatus clearly involve a disintegrating process, an expending of energy.

“It can tell the hour in the middle of the night without a time-piece.”

We can easily imagine that a person who, before retiring to rest, has been anxious to awake at a certain hour should, by that anxiety, divert the stream of nutritive agency strongly towards the very cells which would incline him to awake about the time desired.

In all cases of restored and increased mental capacity, then, it is indispensable to bear in mind that the nutritive agency must be at work. To suppose that mental operations, such as are displayed in consciousness, take place without consciousness, *and with no other difference*, implies that such an amount of dissipating action goes on that the leak must equal or exceed the influx.

We now call attention to the fact that two of the modes of activity classed by Miss Cobbe under the head of “Unconscious Cerebration,” namely, dreaming and the automatic movements of the motory centres, are quite distinct in character from the remaining four, and therefore should not be brought under the same class. To distinguish clearly production from expenditure, of mental energy, and to point out the part which each has to perform in the mental economy is, we opine, most essential to the attainment of an intelligible and consistent system of cerebral physiology. But that a deficiency in this respect evidently exists in Dr. Carpenter’s doctrine is, we think, fully shown by the fact that a talented lady like Miss Cobbe should give such an exposition of it as that which has here been examined.

We now proceed to a more minute examination of Dr. Carpenter's opinion that the sensorium is the seat of all consciousness. In the April number of the "Contemporary Review" he states his doctrine in the following words:—

"An examination of the Anatomical relation of the Cerebrum to the Sensorium, taken in connection with the fact ascertained by experiment, that no injury to the substance of the Cerebrum itself calls forth pain,* seems to justify the Physiological inference that we only become conscious of the Ideational changes of which the Cerebrum is the instrument, through the transmission of the impressions of those changes to the Sensory tract at its base. This doctrine has so extensive a Psychological bearing that I may be excused for entering into a somewhat detailed explanation of it. Every anatomist knows that the arrangement of the nervous elements in the Cerebrum is so far exceptional that the 'grey matter' which constitutes its *active* portion is disposed on its surface, forming the 'cortical layer,' the dispositions of which in 'convolutions' allows it to come into that direct relation with a vast expanse of capillary blood vessels which is necessary for its functional activity. On the other hand, the 'medullary' interior of the brain-substance has exactly the same fibrous structure as the nerve-trunks; and though this was very imperfectly known before the microscope came into use, the resemblance was sufficient to cause that very sagacious Anatomist, Reil, to name the radiating fibres which connect the cortical substance of the Cerebrum with the Sensory tract, the nerves of the *Internal Senses*. Now, as Comparative Anatomy seems distinctly to teach, this Sensory tract is the instrument whereby we are rendered conscious of external impressions, and the transmission of the 'nervous modifications' thus excited in the Sensorium to the cortical substance of the Cerebrum through the *ascending* fibres furnishes the instrumentality whereby Sensations call up Ideas—there seems equal reason for believing that when Ideational changes in the Cerebrum give rise to Sensations they do so by transmitting back to the Sensory tract through the *descending* fibres some nervous modifications which those changes involve, thus producing in the Sensorium *the same physical condition, whatever may be its nature, as that through which the Sensation was originally excited.*"

There are, in this passage, several points which demand the closest examination. These points may be elicited by the following questions:—

1.—Are the primary sensations generally under the command of the will? 2.—Is there, between the sensory ganglia and the cerebrum, a class of *sensory* nerves, we know not what

* We cannot comprehend why Dr. Carpenter should cite this fact as telling in favour of his hypothesis; for the Corpora Quadrigemina—a portion of the sensorium—are also, as we are informed by Dr. Maudsley, insensible to pain when their own substance only is injured by experiment.

else to call them, such as Sir Charles Bell never thought of, namely, "the descending fibres," the office of which is conjectured to be the conveyance of messages from the cerebrum to the sensorium, with the end of exciting, in the latter, consciousness of the operations performed by the former? 3.—Is it not impossible for the sensorium to be occupied, at one and the same moment, with sensations which exclude each other?

1.—Are primary sensations generally under the command of the will? As a rule, we cannot, by the excitation of the Intellectual Centres, cause the sensory ganglia to be engaged with their respective sensations. The great mass of men and women will confidently declare that they cannot, by an effort of the will, see in the dark, feel vinegar to be sweet, hear with their ears blocked up, feel cold on the application of heat to any part of the body, or realize hunger immediately after a full meal.* Notwithstanding this general incapacity of the will to excite the sensorium into activity, yet Dr. Carpenter believes that the "descending fibres" exist for no other purpose. Dr. Tuke also, we perceive from his able and interesting treatise lately published, lays great stress on the influence which the mind exerts over the body, which, being interpreted, seems to mean the influence which the will is capable of exercising over the sensory ganglia, for of course the motory ganglia will be allowed to be under its command. Now, as we have already shown, the cases must be extremely rare in which the sensorium has even the appearance of being excited into activity by the "internal senses of Reil:" and in these rare instances it seems more probable, as will be shown below, that the vivid sensation called up is a secondary or remembered one, and that the seat of remembered sensation is the cerebrum.

2.—Is there between the sensory ganglia and the cerebrum a class of *sensory* nerves, namely, "the descending fibres,"

* Every one will readily allow that there is a considerable difference between the perceptions of the mind when a man feels the pains of heat or the pleasure of moderate warmth, and when he afterwards recalls to his memory this sensation or anticipates it by his imagination. These faculties may mimic or copy the perceptions of the senses; but they never can reach entirely the force and vivacity of the original sentiments. The utmost we say of them, even when they operate with the greatest vigour, is that they represent their object in so lively a manner that we could *almost* say we feel or see it. But except the mind be disordered by disease or madness, they never can arrive at such a pitch of vivacity as to render these perceptions altogether indistinguishable. All the colours of poetry, however splendid, can never paint natural objects in such a manner as to make the description be taken for a *real* landscape. The most *lively* thought is still inferior to the *dullest* sensation.—*Hume's Essay on "The Origin of Ideas."*

whose office it is to excite, in the sensorium, a consciousness of what is occurring in the High Court above? We are not aware that the anatomists mention the existence of any *efferent sensory* nerves; therefore we conclude that they are only imagined by Dr. Carpenter to exist, because his hypothesis demands the postulation of some such sensory medium of communication between the cerebrum and the sensorium.

"If the doctrine here advocated be correct," says Dr. Carpenter, "the Anatomical and Physiological relation of the Sensorium to the cortical substance of the Cerebrum and to the Retina are *exactly the same*; so that, as no modification produced in the Retina can affect our consciousness save by the transmission of a change along the Optic Nerve, which excites a certain physical action in the Sensorium, so no Ideational modification of the Cerebrum can affect our consciousness, save by the transmission of a change along the nerves of the 'Internal senses,' which excites an analogous physical action in the Sensorium."

To make the analogy here mentioned less, as it seems to us, a case of "a river in Monmouth and a river in Macedon," it should be shown that there are between the retina and the sensorium three kinds of nerves, the in-bearing and the out-bearing sensory, and the motory. But how this supposition can be made plausible in view of the great Nerve-system of the Cranio-spinal-axis, we fail to perceive. Is Sir Charles Bell's discovery subject to exceptions in the medullary region of the cerebrum?

3.—Is it not impossible for the sensorium, at one and the same moment, to be occupied with sensations which exclude each other? This is a question of vital importance, one which demands the closest attention. But it requires, in the first place, to be explained. Sensations exclude each other when it is impossible for a sense-centre to be engaged, say, as to the very same cells, with two modes of action which cannot co-exist. The very same cells in the visual sense-centre cannot, at one and the same moment, see brown and yellow; or, again, two visual sensations being felt as occupying space cannot, at one and the same moment, be felt as filling an identical locality in the field of vision. Then again, if the whole field of vision is occupied by certain sensations, as it invariably is during the light when the eyes are open, it cannot be occupied by other sensations without the displacement of the former.

Now attend to this fact: it is quite common, in broad day-

light, with the eyes open, and therefore with the whole of the visual sense-centre engaged in the performance of its peculiar function, to have the features of an absent friend vividly occurring to our memory. Is this remembrance of our friend's features located in the sensorium? We cannot understand how that can be; for, as has been shown, the whole of the visual sense-centre is preoccupied in the performance of its own proper function. Since, therefore, it is impossible for the sensorium, at one and the same moment, to be occupied with sensations which exclude each other; and since, when the whole of the visual sense-centre is engaged with *this* primary sensation, it cannot also be engaged with *that* unrelated secondary or remembered sensation, for the one kind of action involved would exclude the other—it necessarily follows that we must seek, for the remembrance of a sensation, some other seat than the one pertaining to a primary sensation. It has also come to our notice that while repeating aloud such a proposition as twice four are eight, we are also able mentally to repeat—twice five are ten. What is to be gathered from this fact? That the motory centres must be entirely engaged with the former of these propositions, and that the seat of the latter must therefore be exclusively mental.

From these, and other data laid down during the course of this examination, we conclude that it is not true to say the cerebrum must re-act downwards upon the sensorium as the condition of our becoming "conscious either of the formation of ideas or of any intellectual process of which these may be the subjects."* We have shown that these ideas and intellectual processes exist for us only as modes of consciousness, and that this consciousness, while necessitating, as its prior condition, production of energy, which seems adequately to account for all those mental results that the hypothesis of "Unconscious Cerebration" is imagined to explain—necessitates as its co-instantaneous condition, the expenditure of energy.

But we have also spoken about the necessity of secondary sensation having a seat separate from that engaged with primary sensation. Which, then, is probably the seat of the former? Remembered sensation we conclude to be the ground-work of ideation. Thought, intellection, must have form, shape, or quality. The fundamental quality of thought we believe to be secondary or remembered sensation. When we have a primary sensation, say of a welcome face, this

* Carpenter's "Principles of Human Physiology," 7th Ed. Functions of the Sensory Ganglia. Functions of the Cerebrum.

primary sensation being much more vivid than the secondary one which results from it, the latter is, like starlight during sunlight, obscured. But let the primary sensation be absent, then the resulting secondary sensation is clearly realised as forming the basis of our thinking, that without which cogitation does not exist, it being universally felt that the groundwork of ideation is a kind of faint sensation. See the quotation from Hume given above.

That the sensorium, as the process of evolution advances in the animal scale, ejects remembered sensation, retaining primary sensation only, and causing the former to migrate to a higher seat, the perceptive centres, seems to us more than probable. The fact that the higher Invertebrata, although wanting the cerebrum, yet manifest astonishing instinctive intelligence, does not, we think, warrant the conclusion that the sensorium must be the seat of all consciousness, even in those animals which possess a highly-developed brain. If we may be allowed a conjecture on this subject, we should say, that since such insects as the bee and the ant have no cerebrum, the groundwork of their instinctive intelligence must be merged in primary sensation. But that in the human brain it is different; for therein it seems that while the sensory ganglia are wholly occupied with primary sensation, the ideational centres may also be co-instantaneously engaged with secondary sensation, and its various evolutions. Whereas then the higher Invertebrata appear to manifest intelligence in connexion only with primary sensation, and that in fixed grooves or instinctively; Man, on the contrary, possessing a highly developed cerebrum, thinks through the medium of his secondary sensations, and consequently enjoys much more freedom, power, and variety of thought.

We feel bound, then, to come to the conclusion, in opposition to Dr. Carpenter, that the addition of the cerebral hemispheres in the Vertebrated series *does*, to a certain extent, limit the endowments of the sensory ganglia. What was once a terminus of some importance, becomes now simply a considerable station on the line; and we certainly fail to see that this idea, as Dr. Carpenter holds, is contrary to all analogy. For, as we take it, where the sensory ganglia are not yet evolved in the animal scale, still the nervous system must be rudimentally sensori-motor; and where the cerebrum is not yet evolved in the same scale, still the nervous system must be rudimentally ideo-motor, which is to say that what is rudimentary in a lower centre is evolved into a higher form

wherever a separate seat is also evolved for it. We consider it unphilosophical, and contrary, indeed, to the analogy of Nature, to draw a hard and fast line between proximate higher and lower grades of evolution. For this reason and others, therefore, we conclude that what exists in the sensorium as rudimentary intelligence, in brains devoid of a cerebrum, no longer exists in the sensorium as such when a cerebrum is superadded in order to admit of the intelligence assuming a more developed form, namely, intellectual and emotional *consciousness* or *knowing*.

This paper contains, among other things, the answer we feel compelled to return to Dr. Carpenter's question in "The Contemporary Review," namely, "Does not all Psychological as well as Physiological probability point to the identity of the sensorial instrumentality through which we become conscious (1) of a *present* impression, and (2) of a remembered sensation?"—and the answer is a negative one.

The Madmen of the Greek Theatre. By J. R. GASQUET, M.B.

V.—THE MAD HERCULES.

(Continued from vol. xix. p. 58.)

The *Mad Hercules* is not one of the best of Euripides' tragedies; but it has a particular interest for us, because it is the only one extant in which madness is personified, and introduced on the stage. This had been already done by Æschylus, in his version of the story of the Bacchæ, and was adopted by Euripides amongst the terrifying effects borrowed from the elder dramatist for this play.

The early part of the play does not concern us, and its argument may be briefly summed up. Hercules has completed the last of his labours, and has returned to Thebes to find his wife, Megara, and his three children, in the power of his enemy, Lycus, who was about to put them to death; to deliver them, and to slay Lycus, is an easy task for the hero, who remains within the palace, while a chorus of Theban elders chant an ode of triumph for his final victory. This is interrupted by the appearance on the stage of Iris, the "Handmaid of the Gods," who leads the terrible spectre of Madness, *Λύσσα*. Iris explains that they come with no hostile designs against Thebes, but only to carry out the