M I N D

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY.

I.—FORGETFULNESS.

THE words 'forget' and 'forgetfulness' are used with more than one meaning. Dr. Noah Porter (*The Human Intellect*, p. 311) quotes the following from Stiedenroth:—

"Forgetting admits of several degrees or stadia. The first is a momentary displacement of an object apprehended, which is yet certain to spring back as soon as the object displacing it is withdrawn. The second is a comparative withdrawal of the attention, as when we divert our mind from a painful sensation, or as we say, forget it, in labour or play. The third is when an object will not present itself spontaneously, but we must bethink ourselves in order to recover it. The fourth is when we bethink ourselves in vain. The fifth is when it has vanished for so long a time that we question whether we can by any effort bring it back. The sixth, when we conclude that it is absolutely certain that we shall never recall it again."

To the above we may add that total forgetfulness occurs only when all record of the psychical phenomena thus forgotten has disappeared from the individual absolutely, not merely beyond all recovery, but so that there is nothing left to recover. Using a similitude, the invisible leaf of the book of memory has not become temporarily fastened to another leaf, nor been torn out and hidden with a possibility of recovery, but has been utterly burnt, so that its constituent parts have become scattered and have entered into new combinations with the neighbouring part of the universe. Without any similitude, if a man totally

forgets the contents of the leaf of a book which he has read, then there is no Disposition, Trace, or Record left with him in correspondence to the page thus forgotten. In giving this as an example of total forgetfulness, we do not mean, however, to imply that all effects of reading the contents of this leaf are forgotten or lost to the individual concerned.

Now a hypothesis has been mooted that total forgetfulness does not occur, and seems to have been simmering in the minds of many for some time; never yet proved, but often assumed. Once no one would have disputed that we forget, forget often, and forget totally. At present, it seems worth while to bring forward evidence that total forgetfulness is highly probable.

The difficulty of disproof is increased by the fact that we cannot distinguish between traces no longer remaining, and traces which remain and yet can neither affect our conduct nor be revived in any way. But we may bear in mind that the burden of proof rests on the shoulders of those who have originated the hypothesis in point.

Sir William Hamilton is responsible for its introduction to English experience (see his *Lectures on Metaphysics*, V. II, p. 212). The whole passage, pp. 211-214, must be taken into account, in order to see how the author quoted is forced to his conclusion. "The act of knowledge is an energy of the self-active power of a subject one and indivisible; consequently a part of the Ego must be detached or annihilated if a cognition once existent be again extinguished. Hence it is that the problem most difficult of solution is not, how a mental activity endures, but how it ever vanishes,"—and so on. Solving the problem, as he thinks, by means of the "latent modifications" he is unable to go beyond irrecoverable latency, and the lowest ebb to which he can imagine a cognition retiring is that "it may be absolutely lost for us in this life, and destined only for our reminiscence in the life to come". With Hamilton, the approach to forgetfulness is as of the hyperbola to its asymptote. The content of memory is supposed to diminish indefinitely without absolutely vanishing.

In Dr. Carpenter's *Mental Physiology* (c. x., on Memory, p. 429, 1st edition) we find the following:—"It is now very generally accepted by psychologists as (to say the least) a probable doctrine, that any Idea which has once passed through the mind may be thus reproduced, at however long an interval, through the instrumentality of suggestive action". This sentence is modified by "very generally," "may be," "which has once passed through the mind," and "probable," and counter-modified by "to say the least". At p. 453 we find—"It seems then to admit of question, whether everything that

passes through our minds thus leaves its impression on their material instrument"—"thus" referring to the permanent traces. Here we find at best only qualified and quasi-venturous denials of what might thus seem to be generally accepted, namely, that we retain traces of the whole of our past lives in our normal states.

There is a marked indication of a similar current of thought in Dr. Maudsley's *Physiology and Pathology of Mind* (p. 183, ed. 1867):—"There can be no memory of what we have not had experience of in whole or in parts; and nothing of which we have had experience can be absolutely forgotten".

In *What am I?* (V. II., p. 439), by a final flight of imagination, Mr. Serjeant Cox extends the permanence of traces far beyond the mind as follows:—

"Suppose a man to be transported to different parts of space, with a knowledge of all distances, and provided with a telescope that would make all objects visible at any distance, such an observer would be omniscient." "Thus the universe contains an indestructible and incorruptible record of all the events of the past. They have been projected into the Ether, and are carried forward into space by the wings of light, actually existing in form and colour. The most secret deed that is done lives through Eternity. There is no act of virtue, no crime, that is not projected into heaven, painted upon space, and retained there for ever!"

It is but fair, on the other hand, to say that modern psychologists allow exceptions to this rule of permanent traces. Dr. Maudsley says of pain (p. 192)—"It is not the result of organisation but the token of disorganisation. How then should it be accurately remembered?" Before this he remarks that we cannot recall an emotion where the *form* has been almost lost in the commotion, quoting Shakespeare's "formless ruin of oblivion".

In fact no valid reason has ever been given why we should not recognise even in healthy individuals the existence of psychical storms of such a kind that traces of experience are destroyed wholesale during their continuance. During these storms, pleasures, pains and complex emotions connected with the memory of events may die out, not only beyond recall, but totally, leaving no trace behind.

The phrase "leaving no trace behind" is used with a purpose here. Hamilton introduced his hypothesis to English experience on metaphysical grounds which now would scarcely be accepted as valid. The hypothesis being successfully introduced, the grounds for its introduction are now forgotten, or at least it is not remembered that they would now be generally considered untenable.

On the other hand, the doctrine of Conservation of Energy

has become generally accepted by men of science, but unfortunately it has often become perverted to uses for which it was never intended. So again the notion of Continuity has been applied to discontinuous things, and above all, especially in psychology, the *effects* of events and the *records* of events have often become confused.

For a given event the record and the result need not be one and the same. A series of disturbances may combine to produce a certain result which is not their record, and such disturbances may be recorded by something which is not their result. If a person copy an extract out of a book, the extract is a record of what was in the book even though the book be lost, yet it is a result of the energy of the person writing and in no way depends on the quality of the energy of the book, potential or actual. On the other hand, if a book is condemned to be burnt, when there is no other copy like it or derived from it, the record perishes, yet the effect of the potential and actual forces of the book does not perish: far from it, the book becomes an agent in its own immolation.

To take another illustration: suppose two equal stones are thrown together into a pond, so as to fall into it at the same time but not quite close to one another; then the well-known waves increase in ever widening circles; where the two sets of waves intersect, the water at the wave crest is of double height, but where the crest of one wave meets the hollow of the corresponding wave from the other stone, the water remains at the original level. Of course this is only a very simple example of the interference of waves. Wherever waves interfere, then the record of the existence of the origins of these waves is necessarily imperfect at the time of interference. Yet in the case of the water the unaltered level, and in the case of interfering light the darkness, are results of the co-operation of the causes concerned. Had only one stone been thrown into the water, there would have been no interference until the waves became reflected from the bank, and then the record of the single event would have begun to destroy itself.

In the birth and destruction of relations there need be no violation of the Conservation of Energy; else, how could newspapers become printed? It is true that we can determine empirically the relation between the quantity of printed matter and the quantity of paper and ink used; but so also at some future time it may become possible to determine empirically the quantity of energy transferred in remembering and forgetting.

That every cause has an effect, and that all our actions have effects following through future ages of ages, has very little in

common with the supposition that all the records of our actions are preserved. They belong to different spheres of thought. If the records of particular actions are partially preserved through some results of these actions, so also they are destroyed in some measure through other results.

Taking Mr. Serjeant Cox's example of the indestructibility of the records of actions, it is sufficient to state that, although a book be full of printed matter, the mere fact of keeping it closed prevents any record of its contents escaping to the distance of a yard, much less therefore is it likely that the actions of Englishmen hidden by roofs and still more by clouds, can be seen by the most perfect human eye with all possible telescopic adjustments at the distance of the nearest fixed star.

Empirically it is found that the records of memory, like trees and fungi, are subject to growth and decay. And again, while admitting the probability that the law of Conservation of Energy is applicable to the records of memory, it has never yet been proved or attempted to be proved to be true of all the energies of human beings.

Some instances of forgetting where we bethink ourselves in vain, occur in Taine *On Intelligence*, Book II., c. ii., 'Laws of the Revival and Obliteration of Images' (where by Images are meant presentations or complex psychical phenomena corresponding to physical stimuli, not necessarily visual). In this chapter are given three conditions unfavourable to the Revival of Images:—(1) All that lessens the attention lessens the chance of revival: "a musket shot, the flash of a cannon, a painful wound, frequently escape attention in the heat of battle, and not having been observed cannot revive; a soldier suddenly finds he is bleeding without being able to recollect the blow he has received". (2) The want of repetition diminishes the chances of revival: we can seldom remember the pattern of the clothes of an individual with whom we have conversed only once, although we noticed it at the time. (3) Images grow dull by [varied] repetition: a man who could remember the image of a hen in a farm-yard well enough if he saw it alone, might not remember the image of any one hen if he saw a large number together, yet might easily remember an elephant or hippopotamus, because he has only seen one or two specimens, and has therefore a precise image.

Were perfect traces or dispositions corresponding with former experience to retain a place in the individual, we should find that where the original experience involved active use of the body, the revived experience would also be accompanied by active and passive elements in fair proportion of intensity between the revived and the original. Now this is not generally

the case. In remembering, the passive elements of experience are generally revived better than the active. If ever the active elements are revived in due proportion, we call the revival 'imitation' or 'acting' rather than remembering. (Of course all revival of the elements here called passive is active, but the activity in such cases is not the result of the traces of the original activity.) Even when the active elements have been restricted to attention, as in listening to a speaker or looking at a face, whenever these are duly revived the individual says no longer—'I remember hearing' or 'seeing,' but rather, 'The voice is ringing in my ears,' 'I see him before me in my imagination'.

There is little doubt that sometimes traces practically perfect remain for a time in the case of a good blindfold chess-player, as the American player mentioned by Taine (p. 311) who said, "I have never played a game without having played it over again four or five times in the night in bed with my head on the pillow"; or in an individual with good verbal memory like the young Corsican (quoted by Hamilton, V. II., p. 219, from Muretus), who could recite some thousand words in order, after once hearing them, and even give the first, third, and so on right through; or like the idiot mentioned by Mrs. Somerville, who could repeat a sermon *verbatim*, indicating also where the minister blew his nose or coughed during the performance.

Setting aside rare examples such as the above, which mostly concern the revival of visual or auditory phenomena taken separately, and which have become conspicuous for their rarity, we may hold in general that most of the traces or dispositions are deficient in elements ensuring adequately co-ordinated action, when they are stimulated so as to bring about a revival or reminiscence.

We proceed to notice other elements in which the traces or dispositions seem weak or deficient, so far as we can judge from normal states of the individual.

In the active lives of individuals, Selection plays an almost incessant part. For instance it occurs in finding the way, buying fish, obtaining the meaning of a word by aid of a dictionary, and in adopting a method of solving an equation. To select implies to reject and even to ignore. Of course we cannot be said to forget a circumstance which has never influenced our conscious existence even while we have ignored it—as a hidden mine near a footpath over sand-hills. Yet there have been circumstances, materials, words and selections of words, in correspondence with which we have experienced presentations, which nevertheless we have ignored and forgotten. With the increase of the extent and complexity of the relations implied in our knowledge, the extent and complexity of the

traces forgotten increases also. One who selects things, rejects, ignores and forgets things. One who selects ways of thought and action, rejects, ignores and forgets ways of thought and action, including the objects concerned therein. For example, if one orange seem the ripest in a basketful and so be chosen, the remainder probably become forgotten; in playing chess, crossing a large town, climbing rocks, or carving wood, men do not for the most part remember all the ways of action thought of tentatively, and then ignored. Using an old simile, the higher we climb the tree of learning the higher are the branches with twigs and leaves passed by, rejected and ignored. The larger the tree grows the greater is the number of branches thus rejected.

The power of selecting what seems useful, and ignoring what seems useless, is a most valuable aid to the advance of knowledge. We march to the battle with the unknown as little burdened by baggage as possible. In the process beginning with learning to read and continued until we understand Euclid, we first notice separate letters, then separate short words, then long words and short sentences, then we frame a symbolic method for ourselves by which we read the meanings of words rather than the sounds associated with them, the meanings of sentences and the meaning of a whole chain of related sentences. So that when we become familiar with Euclid's method, separate letters, words and even sentences are forgotten.

In writing out Euclid, the sentences become reconstructed in a way suggested by knowledge of the drift of the propositions and the style in which they are elaborated, rather than from any actual memory of the *ipsissima verba*. Also, in this way a word occurring in the original, *e.g.*, circle, need not result from the trace of the word circle originally read in the proposition now written out, but rather comes by association with the visual image known by that name.

In using the syllogism or reasoning in some similar way where two terms only are retained in the conclusion, the middle term is ignored for the time. If we did not thus ignore terms in using conclusions we should be compelled to remember all the terms of the syllogism, and worse still, all the terms of a sorites, and all the calculations in an arithmetical problem. This would be highly obstructive to the march of thought. Of course this process of ignoring for the time is no proof of utter forgetfulness, but it certainly aids any existing tendency that way.

Again, in the well-known process of selection from a classified arrangement, we find ourselves perpetually rejecting and

ignoring: thus Samuel elected Saul by rejecting tribes and families. With well-known classifications, the process of selection is often unconscious for the most part and so cannot be adduced here. Men do not consider whether a cuttle fish is a vertebrate, but begin by calling it a cephalopod. The process of looking out for a word in a large dictionary and then selecting the meaning apparently best suited for the passage in hand offers an example of selection from a classified arrangement, in which much is almost necessarily noticed and yet ignored.

The full verbal memory alluded to above as possessed by Dr. Leyden and others has its disadvantages. Thus, when Dr. Leyden wished to refer to a passage in anything he had heard or read (and remembered thus perfectly), he was obliged to go over a large part of the record in his mind before he came to the place required. So of the Corsican, Giulio Guidi, a passage is quoted in the note at the end of Hamilton's 30th Lecture to the effect that he produced nothing, for his unfortunate memory had killed all his creative faculty: "It is with the precious gift of Memory as with all other gifts—they are the curse of the gods when they give too much". The misfortune in these cases is not that the individuals remember, but that they remember what is of no use to them. They remember their experience rather than the conclusions they might have drawn from their experience. Nevertheless some of the most original minds have had gigantic memories—for example, Leibnitz, Euler, and Gauss.

Examples of good practical memory and therefore of good practical forgetfulness may be found in Galton's *English Men of Science* (p. 111):—

"Ex. 1. Next to no verbal memory but good for facts, small and great, which will fit into any chain of reasoning."

"Ex. 2. Of moderate verbal memory but strongly retentive of facts and figures, so far as they are related to any subject on or in which I am engaged."

"Ex. 6. Great memory for figures, can get up pages for examination before committees, and dismiss them from memory afterwards."

"Ex. 8. Never kept a diary. Can forget useless knowledge such as formulæ, rules, gossip, &c., very fast."

The evidence given by scientific men in this work seems to be in favour of what is called 'a good general memory'; but it ought to be noticed that, in its ordinary sense, this phrase does not refer to rejected middle terms, or rejected genera and species, rejected results of incipient comparisons, or names ignored or passed over in a long list; we do not think that we have forgotten them, for we do not think anything about them at all. Again, not many are aware that,

even though they are generally allowed to have good memories as a rule, such a good memory is of a special type in the midst of an ocean of forgetfulness. Suppose a classical scholar remembers words well, does he also remember pictures and strains of music? Or, again, supposing a musician remember what he has heard wonderfully well, as Mozart remembered the music of the Sistine Chapel, does he remember architecture, painting, poetry? Some remember the shapes of objects and yet have the greatest difficulty in remembering their colour, and so on. It is therefore easy to see that it is very likely for anyone to leave out of his reckoning the innumerable experiences forgotten by him, such as left only a slight trace on his mind at the time, while the only cases of forgetfulness which could leave a permanent impression, would be where he wished to remember and found that he had forgotten.

Forgetfulness occurs when there is a gap in the series of what we remember, as when a line of blank verse becomes missed out. Yet there are also two other distinct kinds: (1) When the disposition, trace, or record loses depth of meaning; (2) when it becomes distorted.

(1) Like a threadbare coat preserving its outward shape, and to some extent covering the body, but with a scantiness of thickness and consequently of warmth, or like a goodly apple rotten at the core, so there are words and sentences in habitual use having no longer their original depth of meaning; old associations, pleasures and pains have died out, the links between their traces and traces of other experiences have disappeared, yet the words remain and the individual is perhaps not even aware that they mean much less to him now than in former times.

In speaking or using words in thought, each sentence flows along accompanied by currents of deeper and deeper import. Isolate the words from the deeper currents of sense, the obvious meaning remains the same, or we may even use the words without noticing the meaning at all. It is when the obvious current of meaning remains that we may be most oblivious, that something may possibly be forgotten.

Sometimes we find ourselves reading words in this superficial way; especially when in a hurry, our eyes trace the words, and an accompanying sound seems to arise on our ears, yet the meaning is far from us. So men read words and phrases with the outward expression of deep emotion, although the depths of their feelings are not really stirred at all. The expression has survived the reality.

Sometimes, as in reading words apart from their meaning, we can forget for the moment without having anything like total

forgetfulness. So when approaching a perfectly familiar neighbourhood, we may cut off all old experience such as ought to be suggested by the view before us, and by imagining that we are going to a strange place put in appropriate accompaniments in accordance with our fancy.

Again, we may prevent ourselves from becoming unfit to discuss matters calmly by suppressing the accompaniments of recollections appealing to our feelings, although we may really act with full knowledge of the existence of these accompaniments. A surgeon while operating may suppress the memory of pain associated with a similar occasion, without in the least suppressing the knowledge of the relative painfulness of the parts concerned.

It will be found that we forget much that is convenient to forget by the simple process of not remembering when the opportunity occurs. A mass of recorded circumstance is connected with the record of an event which acts, so to speak, like a handle to the reminiscence. We know well that if we think about the event the recorded circumstance will become developed in reminiscence. We avoid thinking about the event, and the reminiscence does not follow, and so the traces lose one chance of renewed vitality. If, for instance, A knows that should he think of B who was in the same class with him at school he will also think of other class-mates, and then thinks no more of B, it follows that he has passed over one opportunity of thinking of his class-mates—of infusing life into the traces still preserved, and so has not made an attempt to arrest their natural decay.

Suppose, again, relations are better remembered than related characteristics, as the shapes of the boundaries on a map rather than the colours of the countries, or the time of an air rather than the timbre of the notes, or, *vice versa*, the characteristics better than the relations as the colour of a patch of moss rather than its shape. We have the case of traces renewed unequally in normal conditions: it is still quite possible that such traces are revived equally well in abnormal conditions, yet it is not probable. It is much more likely that they have become decayed in some ways more than in others. This likelihood is made much stronger in the frequent cases where we wish for instance to remember the colour, and still only remember the shape with a colour supplied merely from imagination.

(2.) In forgetfulness by distortion we find the best proof of total forgetfulness. A schoolboy writing from dictation spells a word wrongly, his exercise is corrected in due course and the word is written rightly above the word written wrongly. But the boy, instead of forgetting the wrong spelling and re-

remembering the right, or remembering both and distinguishing the right from the wrong, may remember the wrong spelling more firmly than ever under the mistaken impression that it is the right.

In endeavouring to remember odes of Horace learned years ago and repeated perfectly well some time after, we find that some seem entirely forgotten, some stanzas are forgotten, some transposed, some lines are transposed, some words missed out, and other words of equal length inserted. The more we try to remember the more clearly we notice that certain changes have taken place in the traces. Like names written on the bark of a tree they have become distorted by the change of years.

The transposition of traces of experience, especially of words and sounds, occurs so often that most of us can remember examples. The whole family of malapropisms is nurtured upon this peculiarity. One law is almost universally prevalent: if one of two words both occurring in one sentence is used for the other, it is supplanted by the other also in its own place, so that a transposition really occurs. Sometimes however the word inserted instead of the first becomes retained in its own place also and thus one word is lost from the record. This is like what occurs in the returns from a small town where the number of deaths is inserted instead of the number of births and retained for the deaths also. By transposition, as we find sometimes, a name has become attached to the wrong person, and a historical character is associated with the wrong date.

The third of M. Taine's causes of forgetfulness, where the images become confused through their number and variety, may be extended to images occurring without corresponding external phenomena, and thus be shown to be a most fruitful cause of practical forgetfulness. For instance, a hen may be remembered only vaguely, not because other hens are seen at the time or afterwards, but because other hens have been seen already, and so their traces have left their influence on the traces of this last observed animal.

If an old man try to recollect his own age of 76, it is quite possible that the traces of the adjacent numbers, 74, 75, 77, being already connected serially with 76, become so united that any one of them may be revived indifferently when he tries to think of his age. Again, one may forget the principal street of a village once visited not because the traces are really gone, but because there are other principal streets of other villages which present themselves equally readily to the memory.

Whenever the memory of an associated fact is as strong as the memory of the fact we wish to recover and the clue given by the

name affords no means of ascertaining which is which, we cannot possibly know which to adopt.

In illustration of the distortion of traces it is instructive to compare the visual phenomena (*Nachbilder*) derived from looking at bright objects somewhat steadily. Impressing the visual apparatus with the stimuli of light coming through a window divided into small panes and shutting our eyes, we can watch the after-image change in shape and fill up, gradually losing its original outline while the sensitive parts of the body concerned become renewed by the influence of the circulation. While the waning phantom changes slowly in shape the colours become complementary in turn, as first green, then red, then green again, and sometimes the shape becomes very different from the original.

Forgetfulness sometimes assumes the forms of exaggeration and multiplication of traces. Exaggeration is very common and by no means always voluntary. When the traces of our memory have not become adjusted to altered circumstances there is often virtual exaggeration, as, for instance, when the traces of what we have experienced in childhood survive, they are out of proportion with present experience. As a kettle seems longer in boiling to a child than to a man, it would be very pardonable if anyone were to say, "kettles used to take a longer time to boil when I was a boy"; and as of course a mile seems longer to a child than to a man, in revisiting old scenes, we think of a village as a long distance off, whereas anywhere else its distance would not seem great at all.

But apart from this natural want of adjustment there is a true exaggeration varying with different idiosyncrasies and different kinds of education: beginning with the appearance of bright objects and the loudness of sounds, it penetrates to the most important thoughts. It occurs in the mind of a child going to a pantomime, and forms a strong support to those who voluntarily submit their minds to the direction of others. Among half civilised people and among the insane, it occurs without restraint and leads to the wildest conclusions.

The multiplication of traces is not exaggeration although it may lead to it.* Thus the number of people in a room, of buttons on a coat, or of boots tried on in a shop, may become unduly increased in memory and hence exaggeration would follow. It would be an interesting investigation to ascertain how far and under what conditions this multiplication of traces

* Multiplication is of discontinuous, whereas exaggeration is of continuous, things. A drunkard who sees two moons multiplies, one who mistakes a haystack for a house exaggerates.

extends among men in ordinary health ; of course in insanity, multiplication like exaggeration becomes almost boundless.

Sometimes it is possible to observe presentations in process of multiplication. I remember once, while awake in bed, seeing a large number of letter S's appear as visual phantasies and increasing with extraordinary rapidity. Something like this can be brought to pass voluntarily ; for instance, a mathematician may imagine an equilateral triangle in one direction, and then another and then another and so on—in different apparent positions. This process is not very different from that by which a boy's after-image of the sun becomes multiplied through watching larks soaring on a fine day—the after-images occupying different positions because the eyes, and therefore the sun relatively to the eyes, have occupied different positions, and as they co-exist and occupy different positions, they are multiplied. So the S's mentioned above became assigned to different parts of space as the eyes were moved about, and the attention directed in different directions when the registering apparatus was in a peculiarly sensitive condition. Finally, wherever and whenever, as in comparison of visual sizes, we can transfer a psychical object by means of imagination from one part of space to another (psychically, of course) we run the risk of multiplying the traces of the object thus transformed, and often do multiply its traces in this way. In morbid states when the correctives of multiplication and exaggeration are in abeyance, the consequence is very marked in the conduct of the individual.

It is most probable that all untruthfulness even in imagination has an effect in distorting the traces of what has been experienced by the individual, so that one who deceives another *ipso facto* deceives his future self, that is, until the traces of the recorded consequent psychical effects have vanished.

We will now investigate Forgetfulness by another path. Individuals often remember clearly and well up to the time when they have to use their knowledge, and then when it is no further required, there follows a rapid and extensive decay of the traces. Many schoolboys forget their lessons after they have said them, many barristers forget details got up for a particular case. Thus a boy learns thirty lines of Homer, says them perfectly and then forgets them so that he could not say five consecutive lines the next morning, and a barrister may be one week learned in the mysteries of making cog-wheels, but in the next he may be well acquainted with the anatomy of the ribs instead. Sometimes the decay is retarded for some time after the use is over and then takes place. Practically we sometimes keep a matter in mind not exactly by attending to it but by keeping our attention referred to something connected

with it from time to time. Translating this into the language of physiology, we mean that, by referring attention to a part within or closely connected with the system of traces required to be remembered, we keep it well fed, so that the traces are preserved with the utmost delicacy. Of course, to do this we need not know how we do it any more than we know how thinking of appearances makes people blush, or thinking of a pain in some part of the body makes a pain seem to be there. If we think too much about a subject the parts concerned become too well fed; the traces improve certainly, but our recollection is consequently less like the original, although possibly of higher value except where the likeness is what is aimed at.

In illustration of the above remarks, we may compare the attention repeated from time to time in holding a glass of water in the hands for a short period: if we pay a moderate amount of attention we can hold the glass when it is almost full, but if we pay too much attention to our hands the tone of the muscles becomes altered, and the water runs over. None feel so restless as those who try to stand still.

Now when the use of a record is withdrawn, and attention is withdrawn from it and we think no more about it, we know that we experience a feeling of relief, and we thus may conclude that energy is in some way liberated. If the use is not withdrawn, and the attention is not withdrawn so that we keep the record in mind, we know that this feeling of relief does not take place, and we have no reason to suppose that any corresponding liberation of energy occurs. Also we are well aware not only that after this feeling of relief takes place the record does not seem conserved so well as before, but that we have real difficulty in attempting to remember it. Thus on the one hand there is liberation of energy to account for, and on the other the apparent degradation of the record. It is not rash, therefore, to suppose that the degradation is real, that the record is left to decay, and that the forces which would have tended to preserve it now become useful in some other way.

It is possible that there is great disproportion between the value of the thing forgotten and the direct value of the energy liberated, as great perhaps in some cases as between the value of the Alexandrine library and the value of the fire which burnt it. Still the fact that men forget knowledge they do not seem to require, and often forget it as quickly as possible, shows that the energy liberated is of some value.

In practical life where periodical forgetfulness and accumulation of memory occur, there is no improbability in supposing that an appreciable amount of energy can be locked up from

time to time with the memory, but within a tolerably definite limit, capable of increase to a certain degree by practice, so that the energy used to get up facts of one kind may be used to get up facts of another kind, provided the former become reduced to the level of the general stock of the individual's knowledge.

In different individuals the relative amount of this versatile energy must vary very much. This versatility of mind need not imply a larger energy than usual, but rather a larger amount disposable for the occasion of the moment and liberated again by speedy forgetfulness. So soon as it is liberated it seeks fresh fields and pastures new, and then, as men say, all is grist that comes to the mill. On the other hand, when knowledge is really assimilated so that it requires no direction of attention to keep it from rapid decay (such knowledge for example as is displayed in the ability to read and write or can be acquired at once on hearing of the death of a friend), there is little chance of forgetfulness liberating energy of use for further acquisition.

Putting together the results of common experience on this subject, we may suppose that, in analogy to the process of digestion, the process of assimilating knowledge calls forth an appreciable amount of force, and that we get into the habit of secreting or bringing into a suitable condition an adequate supply of force for the purpose. Suppose now the process of assimilation becomes arrested, the force still in process of secretion increases for a time, and so there is stored up a reserve in aid of future memory. So that it is not so much from the decay of the traces, as from the diversion of the forces used in strengthening the traces, that the power of making new traces is increased.

Further, using the same analogy, it is said that eating cheese helps digestion because it calls forth powers of digesting; so learning by rote improves the memory by calling forth powers of assimilation, which improve the general power of remembering when liberated.

Finally, our memories are like gardens, and the richer they are the more they require weeding. From this point of view forgetfulness is sometimes desirable. There are plenty of maxims current to help forgetfulness, for example, change of air. To these we may add the following general principle:—To forget an experience of any kind, fasten attention on the part giving least permanent interest—if this has present interest it is all the easier to do this: the temporary is remembered at the expense of the more permanent, and thereafter the latter is forgotten, while the temporary drops out from its own inherent want of interest.

We can aid forgetfulness artificially. Thus, in reading a

book, make an abstract, paying attention to the abstract : it gains in clearness but loses in colouring. The abstract is easier to remember at first, it is referred to and remembered, while the book is forgotten. But the abstract is really drier reading and less pleasant to remember than the book, and so having first pushed the book out of memory, it is totally forgotten sooner than the book would be. There is a parallel to the above, in the recipe how to ruin an artist. A picture dealer employs an artist to paint for him alone, then after paying well for some time and so depriving the latter of all his other connections, he lowers the scale of payment gradually until the artist is ruined.

For the present it seems unlikely that the constants of any equation of continuity for the different forces involved in memory are determinable (I mean such an equation as occurs in hydrodynamics between the influx, the contents, and the efflux). It therefore remains an unsolved problem how far the power of remembering may be cultivated without the judgment or the imagination suffering, or how much a general and a special memory may develop without hurting one another. Nor again, supposing a valid measure of the contents of memory found, do we know, beyond the fact that there is a possible maximum, at what time in life that maximum is reached, or how the time varies with individuals and races. And at any time the solution of the problem of the best possible memory ought not to be undertaken without a wide preliminary survey of the individual and social uses of human life. Without such survey, some plausible solution may urge the training of the memory in the wrong direction, the individual may be sacrificed to his memory, the memory of the general may be sacrificed to that of the special, and the memory enduring for years to the memory valid for a year, a week or a day. Thus, as has often happened already, the attempted training would do more harm than good.

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