

to the front. The first places where I saw any celebrations were on the frontier. The rest of the country was quiet, severe, but completely calm and serene. All this inspires me with a great hope. After the declaration of war all discussions ceased, every one felt the necessity of winning. No one is better able to perform miracles than the Italian who is thoroughly convinced that it is up to him to do something. Yes, dear sister, I hope with you that this war will make the Italians. If when they are made, they are conscious of it, if they use all the uncommon gifts of their race for the purpose of organizing and remaining united, then Italy may look forward to a future of power and respect. . . .

THE PHYSICAL BASIS OF PLEASURE AND PAIN.

BY R. E. BOYNS.

HERBERT SPENCER says that "pleasures are the correlatives of actions that lead to welfare." That is doubtless true as a general statement, for it is the pursuit of pleasure that has made us what we are. Every organism, in its struggle to survive, has naturally been guided by its inclination toward the most pleasant feeling. Hence survival has been held to imply the building up of structure, or anabolism, and so anabolism and pleasure have been associated in the orthodox view of organic action. Many observers however refuse to see any connection between the two, for it is not difficult to point out instances where the association is not apparent. The graceful curve of a flourishing *embonpoint* doubtless recalls the pleasures of the table, but it can scarcely be said that growth in general, which inevitably implies excess of anabolism over catabolism, is accompanied by any conscious pleasure. On the contrary, do we not hear of "growing-pains"? There is however a third view which no one has as yet maintained, but which we believe to be the correct one: anabolism is pain, and it is catabolism which is the real pleasure—not merely that which accompanies pleasure, but that which is actually felt in the brain as such.

This seems paradoxical, but a slight consideration of the proofs will demonstrate its truth.

In the first place, no injury is painful. It is the repair which is so. It is not at all painful to cut your finger, as you may have proved by unexpectedly doing so when wiping a razor; but if you have an opportunity to anticipate what is coming, as in the case of

a mere hypodermic injection, you are quite likely to import into the operation some appropriate feelings. It is not, however, until after an appreciable interval that the pain begins and a throbbing announces that repair has started with the celerity which distinguishes an ant community when an invader has worked destruction in its midst.

That we have made the proper association is sufficiently evident in this: if the cutting were the cause of the pain, when it ceased the pain would cease. On the contrary, it begins with the process of repair and continues during the whole time that repair is in progress.

It is common knowledge that soldiers in battle do not feel bullet-wounds, and that fact has been attributed to the excitement of combat being so great as to divert their attention even from severe physical suffering, but that this is an error has been many times pointed out. Kipling, for instance, in his well-known story, *Without Benefit of Clergy*, says that it is not until fifteen or sixteen seconds have elapsed that the sting of a bullet is felt. It is, one might say, nature's command, "Fall in!" to the forces of repair, and when they have got well into action the pain becomes so great as to incapacitate the soldier for further effort, the incapacity and pain being precisely synchronous, no more and no less, with the repair.

In the second place, all catabolism that we can observe is pleasurable, the simplest example being physical exercise, the pure joy of living. There are few pleasures that surpass the vigorous use of the muscles by a healthy young man, while the lassitude and soreness of the succeeding day proceed from the necessary anabolism of repair. In contrast with the pleasure of activity is the *ennui*, the disgust, produced by idleness, when anabolism is triumphant.

Normally our condition is a state of equilibrium between pleasure and pain, but a slight stimulus, either to muscular or merely nervous action, means an expenditure of nervous energy, or catabolic action, in the nervous tract, and this is pleasurable. Long continuance, or sudden and great increase of the stimulation, which means such as to necessitate immediate repair, becomes painful.

Most of these feelings of pleasure and pain come to us normally through the action of several senses, and in any case can only be cognized through the medium of nervous action, but it is to be understood that feelings may be experienced apart from that conscious local association implied in a sensation due to a definite sense organ. The glow experienced from exercise in the open air comes

from a diffuse catabolism over the whole anatomy. We may point however to certain sensations proper as affording ready concrete examples of the association of catabolism with pleasure and anabolism with pain.

The pleasure derived from a beautiful landscape implies that catabolism has taken place in the optic nerve, but the stimulus is so slight that the slower process of the consequent anabolism will be unnoticed. On the other hand direct gazing at the sun is painful, as the excitation is too great for the nerve and the exhaustive catabolism calls for immediate and extensive anabolism.

It is, as all psychologists know, an ascertained fact that a pleasurable stimulus long continued becomes painful just as surely as does an excessive stimulus. The application to sight however is not immediately apparent from the fact that the view, or even the picture, is not continuously the same. A view is in a constant state of change, while the chiaroscuro of a picture varies with the light by which it is seen. The applicability appears more clearly in the case of sound, for a tune is always the same. At first it is enjoyable, but by the twentieth repetition it has probably become distasteful. The gentle rhythm accords with the natural catabolic action of the auditory nerve, but after a time repair fails to keep pace with the waste, and irritation, which is the forerunner of pain, is the result. In the sense of sound too we easily interpret the action of a sudden unperiodic attack of discord or noise, which, as it were, tears the nerve and calls for immediate repair and the accompanying pain.

It is scarcely necessary to follow the implication in the sense of taste by means of honey and quinine, and the same may be said of smell, illustrated by *eau de Cologne* and hydric sulphite.

To some it might appear at first sight difficult to reconcile this theory with the pains of disease, but a moment's consideration will show that here, in fact, is its chief stronghold. The pangs of gout and rheumatism, no doubt, proceed from the necessity for the repair of tiny bloodvessels ruptured by the circulation endeavoring to force its way through them when clogged by the deposits characteristic of those diseases. In the same way colic accompanies repair to the intestines consequent on injuries caused by distension, and all the other pains are similarly explained; but there are two diseases which are especially illuminating: cancer, which is essentially anabolic in its nature and therefore the most painful of all; and tuberculosis, which is typically catabolic, and none are so contented and happy as those who are said to "suffer" from it, espe-

cially in their dreams, which take place during the passage from sleep to consciousness, when catabolism is gradually getting control.

Apparently the only feelings left for consideration are those of hunger and thirst. The satisfaction of these desires consists of course in the catabolic action of the sense of taste and the other buccal and alimentary needs appertaining thereto, and, in analogy with the other cases we have considered, over-indulgence of these pleasures would no doubt proceed to pain, but in actual experience we seldom get beyond that amount of anabolism which implies satisfaction or a sufficiency. The pains we commonly associate with hunger and thirst are however of quite a different character and belong in the same category with the others caused by disturbances of the digestive tract. The pain of hunger is accompanied by a contracted stomach, and the pain of thirst by a swollen tongue, both of which must imply rupturing of small bloodvessels and tissues, and consequent efforts at repair. No doubt many other lesions occur, but it is satisfactory to think that subjects for their study have not been plentiful enough, apart from the difficulty of the investigation, to furnish any accurate knowledge on the subject. Let us hope it may continue so.

It would probably be hazardous and premature to attempt to account for that peculiar *yearning* which accompanies hunger and thirst, but it may be merely the appropriate sensation, like the *ennui* or disgust which precedes the transition from pleasure to pain in the case of over-stimulation of any one of the senses.

Perhaps it might be as well to guard against an almost impossible misconception by pointing out that though anabolism implies pain, it does not follow that destruction or injury implies pleasure, for catabolism is something quite different. It is nervous action within the body, not physical rupture from without.

To psychologists I might also say that I have been at no pains to distinguish between sensation and feeling, or between pain and mere absence of pleasure. Such distinctions are for them. I am merely dealing with their physical basis. It is no concern of mine whether pleasure be regarded as a sensation or a feeling, an emotion, a cognition, or, if you please, a palpitation, a vibration, or a thrill. My sole thesis is that it is something in the brain which corresponds to catabolism, just as sound corresponds to vibration. We have long since had vibrations of air and ether translated into the pleasures of sound and sight by the catabolic action of the auditory and optic nerves, but these are merely special cases of pleasure. This theory extends the idea to the whole framework

of the body. Wherever in tissue of any kind we have catabolic action we have pleasure, until the catabolism becomes so great as to demand anabolism, and pain supervenes. Some day, no doubt, we shall be able to treat the emotions, and even cognition, in a similar way, and these will naturally be found to be special cases like sound and sight, the feelings remaining the all-embracing states of consciousness not limited to any part of the anatomy.

Before closing I should like to draw attention to what the adherents of the orthodox doctrine that pleasure is associated with anabolism commit themselves to. They have to assert that they believe it possible for a nerve or a cell to function by renewing itself, which makes the theory of spontaneous generation a mere trifle in comparison. All observant persons are aware that no machine, whether natural or artificial, can function without a waste of substance. No nerve or cell can act except by catabolism, and if this action had not been pleasurable it never would have taken place at all. It was the pursuit of pleasure which originally called us into existence and which has kept us in activity ever since. If anabolism is pleasure, then, before the development of reason, an animal must be supposed to act as though willing to submit to the present catabolic pain for the sake of the consequent anabolic pleasure. which we know to be beyond the power of even a reflecting person to do.

The whole theory may be expressed and its rationality vouched for according to Mill's method of agreement without waste of words. Wherever we have pleasure we have catabolism, as in the excitation of the nerve of taste; and wherever we have pain we have anabolism, as in the healing of a wound. Or, conversely, wherever we have warmth—functioning, catabolism—we have pleasure; and wherever we have cold—conservation, repair, anabolism—we have pain.

EDITORIAL COMMENT.

This article of Mr. R. E. Boyns is interesting because he criticizes the current opinion that pleasure is anabolism, and pain catabolism; or, in other words, that pleasure is felt in a condition of growth, while pain is decay. He reverses the statement and identifies anabolism with pain and catabolism with pleasure. We expressed our view some years ago in *The Monist*, Vol. VI, and we believe that the theory is a little more complicated than either the current view or Mr. Boyns assumes. We believe that pain is a

disturbance of any kind, be it by anabolism or catabolism. The growing-pain is a disturbance in the tissues and bones of a growing child, and it is the disturbance which is painful, not the growth itself. The same is true of growing and of decaying teeth; both processes are painful. This law is not limited to bodily pain. It is true also of society as a whole, disturbances either of a rapid development or degeneration producing social conditions which involve important experiences. The disturbances themselves may be due either to a rapid growth of society or to the reverse, a degeneration or dissolution, or to any cause that interferes with conditions to which people are accustomed and that demands adjustment to new situations.

Pleasure is different. Pleasure is the satisfaction of a want; the more intense the want has become the greater will be the pleasure accompanying its satisfaction. This theory explains also why pleasures are so different. One may take delight in stimulating drinks while another man abhors alcohol in any form. One may enjoy tobacco, another may be disgusted with its use, or even the very smell of a cigar or a pipe may be repulsive to him. If, however, any person has become accustomed to the use of stimulants he will enjoy them, and the memory of former satisfactions will make the expectation of pleasures more and more desirable.

A correct interpretation of the nature of pleasure and pain is important in reference to ethics. The utilitarian ethics proposed by Bentham and upheld by Herbert Spencer defines the nature of moral goodness as a realization of the highest amount of pleasure among the greatest number of people; that is, pleasure is made the standard of measuring goodness. But if the nature of pleasure depends so greatly upon habits, whether developed in a natural or in an abnormal way, we shall have to turn the tables and make the main question of ethics rather the problem: to what wants shall the masses of the people be educated in order to find their greatest pleasure in the satisfaction of the most desirable functions of their activity? It seems that the simple reverse of the definition of pleasure and pain, as proposed by Mr. Boyns, would not offer a definite and correct solution of the problem, for it will not be difficult to find pleasures that are catabolic and pains that are anabolic. In a word, it would appear that neither anabolism nor catabolism itself can decide whether we have to deal with pleasure or pain, and that their relations to pleasure and pain are, for our purpose, accidental.