THE TWO KINDS OF VIVISECTION—SENTISECTION AND CALLISECTION.

Professor BURT G. WILDER, M. D., of Cornell University, writing to the *Medical Record*, says: Is it not time for the distinct verbal recognition of the difference between painful and painless experimentation upon animals?

All well-informed persons are aware that the vast majority of vivisections, in this country at least, are performed under the influence of anæsthetics; but the enthusiastic zoölaters, who desire to abolish the objective method of teaching physiology, practically ignore this fact, and dwell chiefly upon the comparatively infrequent operations which are attended with pain.

Having read the arguments upon both sides, and had some correspondence with leaders of the anti-vivisection movement, I have been led to think that the discussion may be simplified, and a right conclusion sooner reached, if we adopt new terms corresponding to the two kinds of experimentation.

To use words with no warrant of ideas may be foolish, but it is not necessarily a mark of wisdom to refrain from the employment of terms which have a real significance.

Let us consider an analogous case. Aside from color and size, the *cat* and the *leopard* are almost identical, and are commonly regarded as two species of one genus. Suppose a community to be unacquainted with the cat, but to have suffered from the depredations of the leopard, which they call *felis*. Now, suppose some domestic cats to be introduced and to multiply, as is their wont. In the first place, for a time at least, it is probable that the same name, *felis*, would be applied to the smaller animal, with perhaps a qualifying word. In the second place, should there be certain persons, both devoid of interest in the cats and filled with pity for the mice devoured by them, is it not likely that they would endeavor to include the cats under any ban which might be pronounced against the leopards? Would they not be apt to succeed, especially with the more ignorant and impressionable members of the community, so long as they could assert without contradiction that the "mouse-eater it was only a *felis* upon a smaller scale? Would not even the reputation of the leopards suffer by reason of the multitude of the cats thus associated with them? In short, would full justice be done to either animal until their differences of disposition should be admitted to outweigh their likeness of form and structure, and be recognized by the use of distinctive names?

In like manner there are those who ignorantly or wilfully persuade themselves and others that all experiments upon animals are painful because some of them are now, and most of them were in former times; also, that painful experiments are common because vivisection in some form is generally practiced. It is all *vivisection*, and as such it is "cruel, revolting, or brutalizing."

Having waited long in the hope that some candid discussion of the whole subject might contain the needed terms, I venture to suggest that painful vivisection be known as *sentisection*, and painless vivisection as *callisection*. The etymology of the former word is obvious; the distinctive element of the latter is the Latin *callus*, which in a derived sense, may denote a nervous condition unrecognized, strictly speaking, by the ancients.

some idea of the relative numbers of callisectionists and sentisectionists may be gained from the fact that I have been teaching physiology in a university for twelve years, and for half that time in a medical school; yet I have never performed a sentisection, unless under that head should be included the drowning of cats and the application of water at the temperature of 60° C. (140° F.), with the view to ascertain whether such treatment would be likely to succeed with human beings.

I think that even elementary physiological instruction is incomplete without callisection, but that sentisection should be the unwelcome prerogative of the very few whose natural and acquired powers of body and mind qualify them above others to determine what experiments should be done, to perform them properly, and to wisely interpret the results. Such men, deserving alike of the highest honor and the deepest pity, should exercise their solemn office not only unrestrained by law, but upheld by the general sentiment of the profession and the public.

FEELING AND FUNCTION AS FACTORS IN HUMAN DEVELOPMENT.*

BY LESTER F. WARD, A. M.

Sociology is now recognized as a legitimate branch of Anthropology.

The great French philosopher, Auguste Comte, although the first to introduce the word *Sociology*, did not venture to use this term extensively himself, but preferred the expression *Social Physics*, which must therefore be accepted as the true definition of sociology as intended by the father of the science.

It is important to remember this fact and to preserve throughout this necessary connection between social science and physical science. This, however, has not always been done. The phenomena of human development, may be contemplated from two quite distinct points of view, only one of which has thus far received sufficient attention. These two points of view are those respectively of feeling and of function, and it is the first of them that has been neglected. According to the usual method of approaching such questions, man is regarded as a being requiring for his preservation a certain amount of nourishment and for his perpetuation the begetting of offspring. The two essential factors from this point of view are the functions of nutrition and reproduction. Around the first of these cluster the industrial activities, and upon the second is founded the family. Out of these grow all the later and more complex characteristics of civilization. According to the other method of contemplating human development, man is regarded as a being endowed with feelings. These feelings are in the nature of desires. The existence of such desires involves the effort to gratify them, which effort in turn gives rise to human activities. The condition of society at any time is the result of these activities, just as from the point of view of function, nutrition and reproduction are the two primary essential factors; so, from the point of view of feeling, the gustatory and sexual appetites are the primary and essential factors. The advantage of the latter method over the former is that it affords, as the other does not, a scientific basis for the investigation of the laws of anthropology. The action of an organism in seeking the satisfaction of a desire finds an exact parallel in the action of a chemical molecule in seeking combination with others, or that of a column of air in rushing in to fill a vacuum. The desires of individuals constitute true forces, identical in all respects with the physical forces which other sciences deal with, and all branches of anthropology, including that of sociology, at once take their places as true sciences. This antithesis may perhaps be rendered more striking by considering function as the object which nature seeks, and feeling as that which man seeks. The object or end of nature is the preservation and perpetuation of existing life; that of man, and of all beings endowed with feeling, is the satisfaction of existing desires. The former is objective and constitutes a biological process; the latter is subjective, and is a moral or sociological process.

Properly understood these precesses possess no natural or necessary relation to each other. It is easy to imagine a person wholly destitute of taste. Indeed such cases are on record. The pleasure derived from the contact of nutritious substances with the tongue and palate is obviously distinct from the benefit which it confers upon the system after digestion. Such a person as we have supposed would none the less need food because he had no desire to partake of it.

It is still more easy to conceive of a total absence of the sexual instinct, and this is a much more common pathological condition found in practice. Here the feeling is still more obviously distinct from the function.

Why then do these desires and their functional results so universally accompany each other? The answer is that this apparently "pre-established harmony" of things having no necessary relation or resemblance has been the result of natural adaptation.

The agreeableness of the acts of nutrition and reproduction exists because without it nutrition and reproduction could never be secured. The existence of these pleasures,

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as of all other pleasures, and all pain also, is explained on the theory of selection.

It is desire alone which leads to action. Among the lower animals it is the momentary impulse which always determines action. Hence these, if destitute of these passions in the gratification of which they preserve their existence and continue their kind, would speedily perish.

In man both these desires are strong and constitute the motive, either direct, or indirect, to the greater part of his acts.

There are of course other desires, many of which may be regarded as derived from these, but some of which are apparently also original and natural, but whatever they may be they are in the nature of forces, and all the desires taken together may be appropriately called the *Social Forces*. These social forces readily fall into two groups and each of these is capable of subdivision into subordinate groups, as the following table will show :

- Essential Forces.
  - Preservative Forces.
    - Positive, gustatory (pleasurable)
    - Negative, protective (painful.)
  - Reproductive Forces.
    - Direct (The sexual instinct.
    - Indirect (Parental and consanguineal affections.
- Non-essential Forces.
  - Esthetic.
  - Emotional.
  - Intellectual.

Space forbids the elaboration of this table, and indeed it scarcely requires it. I will only say a word on the last group named in it, the intellectual forces. Upon this point much confusion, and as I think, error prevails. It is at the present time at least, a very small and uninfluential group. Properly it embraces nothing beyond the mere yearnings of the intellect. Its only basis is the pleasure of intellectual action.

I strenuously object to throwing the whole effect of mind in social development into the class of social forces. The social forces are indeed psychic, but they are not intellectual. The intellect is in no true scientific sense a force. It is not a motor influence.

It is characteristic of every true natural force that the body impelled or attracted by it moves in a straight line from the impelling or towards the attracting object. If it move in a curve or any but a straight line this is always due to a plurality of forces acting in different directions. This is true of all the social forces. Desire, wholly unaccompanied by reason, always impels in a direct line towards its object. This is illustrated most clearly by the acts of the lower animals.

The fly buzzing against the transparent pane until exhausted without sufficient intelligence to try another locality is an example daily witnessed. Moths seeking a flame regardless of its destructive power, and rising with scorched wings, plunging anew into the fatal charm, show the action of a force scarcely higher than the purely mechanical. It is so with every form of desire. But for the intellectual agency, to however slight a degree, all animal action, human action included, would be of this direct character. The influence of mind sustains the same relation to the true forces of desire that the rudder of a ship, moved by the helmsmen, sustains to the sails acted upon by the wind. As it is not the former that propels the ship so it is not mind that propels society. The great results which are collectively termed civilization are the direct outcome of these impulsive social forces, guided, of course, by intellect or reason. All the efforts that have been put forth have been made solely for the satisfaction of present desires. The end really reached has not been the end sought. Function has been totally ignored and feeling alone consulted. The ends of Nature have been attained, not directly as objects of pursuit, but only indirectly through the means of Nature which are the ends of the feeling creature.

It has been remarked that owing to adaptive influences these naturally independent lines leading respectively to the ends of Nature and the ends of the sentient organism converge to the same point. The effects produced by obeying the desires in most cases are the effects necessary to preserve, perpetuate, and develop the organism. But here is the fundamental distinction to be noted. These functional effects are secondary. It is not to secure them that the acts are performed. The beings performing them take no thought of them. The only effect in the mind of the agent is the satisfaction of a present desire. It may be safely said that this is almost universally the case even in human action.

But it may be asked what difference it makes, inasmuch as the indirect or functional end is always secured by the previous harmony brought about by adaptation.

With non-progressive beings like the lower animals, it may be admitted that it makes but little difference. Here the chief interest centres on biological questions, questions of anatomy, histology, morphology, etc., and therefore the objective or biological standpoint is usually, though not always, sufficient. But with man, a progressive being, whose actions transform the entire face of the planet and lift him by rapid steps from one plane of activity and life to another, it becomes of the utmost importance that the true nature of his motives be scientifically understood ; that the effects produced be attributed to their true immediate causes and not to indirect or merely incidental ones. Nutrition is not an end of human conduct in seeking food ; it is the satisfaction of hunger. A family is rarely a direct desideratum in human life. Every physician knows how often it is an object of dread. It is only an incident. The great blessings of accumulated wealth have never been the immediate object of industry and financiering skill. These are the direct results of that great derivative passion called avarice which has been so unjustly condemned. Industry, commerce, art, and often invention flow from the "love of money," which has been most superficially called "the root of all evil," when it is really the root of nearly all good in civilization. Labor is performed and heroic deeds achieved not to make the world richer and happier or set examples of nobility for future ages, but to secure the immediate wants of the individuals performing them, to gain money and applause, to win the fair and to support them. Avarice, ambition, love, each has accomplished its direct results in the true civilization of the race.

PROFESSOR EDWARD D. COPE

The bibliography of Professor Edward D. Cope has been ably written by Professor William Hosea Ballou, one of our subscribers :—Professor Ballou states that, "the life of Prof Cope is the index of all that is romantic in science. A sketch of his literature would be void of much of the interest attached without notation of some of the points in his most extraordinary career. At the early age of sixteen he began writing on scientific matters, though he must have attained twenty-four years when his writings first began to attract attention. He is one of the few living writers who has been able to successfully turn at will from any department of living biological forms to those whose remains are found only in fossil state. From studies of this nature he boldly enters the realms of metaphysics, bringing out an astounding number of genuine contributions to knowledge. In the bodies of learned men of which he is a leading figure, he astonishes all who hear him by the facility with which he addresses or converses on topics under discussion. He seems both in his writings and speeches a man prolific in voluminous knowledge of kindred subjects. His investigations have already resulted in his naming upwards of 1,000 species new to science, besides innumerable genera. He has written on every existing family of vertebrates, and revolutionized the classification of the amphibious animals by utilizing the skull as a source of differential characters. The classification of fishes has also been much modified by him.

The best part of his work is undoubtedly comprised in his paleontological (extinct animal) studies which have distinguished him throughout the scientific world. In 1879 the Royal Geological Society of Great Britain awarded him a medal for doing the most work in this line of any individual for the year."

This interesting memoir can be found in the *Chicago Field*, for August 21 and 28, and with the list of Professor Cope's literary papers and contributions, occupies eleven columns of that journal.