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MAN, THE GREAT INTEGRATOR[1]

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FROM the point of view of the circulatory system we may think of one of the higher mammalian organisms in terms of the systole and diastole of the heart. With the heart's contraction a powerful stream of blood is forced into the systemic circulation to find its way through vessels of ever-decreasing diameter to smaller and smaller areas of irrigation. In this way the oxygen carried by the blood corpuscles is distributed to the most remote portions of the body. Then when the force of this contraction has spent itself the heart pauses for an instant and during this pause receives from all these outlying districts of the body the blood which, having been deprived of its oxygen, has by another mechanism been circulated through the lungs to receive a new supply, and when this is done a further contraction sends this new supply along the same paths as before. This constant pulsation which distributes the vital fluid is characteristic in a sense not only of all living matter but of everything organic and inorganic in the cosmos. Wherever we look we find motion, and wherever we find motion we find rhythm or periodicity of some sort. We might therefore reasonably expect, and as a matter of fact do find, that these same principles which control elsewhere are observable in the field of psychological phenomena. The particular aspect of these phenomena to which I would draw your attention are the systole and the diastole of human knowledge, which expresses itself in the constant tendency, so well manifested in the field of medicine, to the development of medical specialities and in the field of science to the separate development of the various sciences. It is the tendency to differentiate, on the one hand, and on the other the reciprocal tendency to bring together, into a common reservoir, as it were, by a process of co-

[1] Address at the opening session of the American Association for the Advancement of Science, Pittsburgh, December 27, 1934.

ordination and integration knowledge from several or from all fields. These two tendencies of differentiation and integration which we see exemplified in this manner are not separate and distinct processes but are the two aspects of advancing knowledge, and it is the recognition of this fact and of the part that man plays in this forward movement about which I wish to speak briefly to-night.

In the first place, I call your attention to the fact that this way of looking at development and evolution gives us a different picture of the organism from the one that maintained during the last century. At that time we were thinking, not of a constant flux of energies without rest or equilibrium at any point, but we were thinking in terms of static pictures. Medicine in particular had developed a concept of the human organism that was largely dominated by the revelations and discoveries emanating from the autopsy room. We looked through the microscope and we saw pictures beautifully colored of cells and fibers, and we jumped to the conclusion that such cells and fibers as we saw there actually existed in the living being, and so there was built up a concept of living organisms which really as a condition precedent demanded that they be dead. It was the mosaic theory, the theory that the organism was composed of cells, that the cells united to form tissues, and the tissues to form organs. In the nervous system we found the reflex arc to be the unit of structure; and in the mind, by a parity of reasoning, it was the sensation. Somehow we believed that a number of cells could be brought together by a process of addition to form tissues and organs, that a number of reflex arcs could be added together and when enough hundreds of thousands of them had accumulated we had the mammalian nervous system, that a number of sensations could in the same way be put together to form a mind. This resulted in a sort of kindergarten idea of a living organism, based somewhat, I suspect, upon the foundation of the five special senses, and gave us in the final analysis a picture quite in harmony with the smug complacency of the mid-Victorian era. The unfortunate thing about it all is that we still find it easier to think in these terms than we do to think in terms of the more modern concepts because we were brought up with these old ideas; they formed part of the habits of our more youthful thinking, and they have been imbedded and preserved in the structure of our language. It requires, therefore, a more than ordinary wrench with the past to free ourselves from these hampering traditions and to be able to think and feel and act as if they were no more.

In the field of general science these traditional ways of thinking have received in recent years a number of very serious jolts. The constitution of matter as made up of molecules and atoms has had to give way to the discovery of a sub-atomic world of bewildering complexity. Along with this new discovery there disappeared the idea of the fixity of the chemical elements and with the discovery of radium emanations, the dream of the old alchemists came true when elements were transmuted one into another. Carnot's principle, which had held sway for so long and which taught that the universe was cooling off and gradually settling down to equilibrium and death, has been called in question by the cosmic rays of Millikan if in fact life itself does not contradict it; and in the field of the study of mind it has been found that beneath and beyond and all about the brightly illuminated spot which we ordinarily think of as consciousness there is a field, a twilight zone if you will, of what we call the unconscious, wherein the play of forces which we call motives, instincts, trends, drives, wishes, have their sway, and an understanding of which is necessary to the understanding of man.

The difference between these recent occurrences and the revolution in our ideas of the cosmos which came about, for example, as a result of Galileo's observations and teachings, is that in the latter case they were received not only with incredulity but with antagonism, with fear, with hatred, and with a sense that the old order must be preserved at any price or disintegration and chaos would reign supreme in this world and disaster in the next. These new observations, however, have all of them come about as a result of scientific research with no great upheaval of opposing public sentiment and with, on the whole, all along the line a general acceptance of the observed facts as these facts were sufficiently verified. To my mind the most significant single feature of our civilization with its many advancing scientific frontiers is the comparative ease with which to-day it is possible to break with tradition when tradition has ceased to serve us.

May I at this point remind you that the field I represent is the field of psychiatry, and that what I wish to do is to give you some little idea of how in this field we have broken with limiting and crippling traditions and as a result have come forth into a new world of thought and knowledge, and something of what we have found, something of its significance for an understanding of man as an integrator.

In the first place, I have suggested only that one of the main features of advance in the psychological field has been the discovery of a great field of mental activities outside of the field of conscious awareness, a region which is ordinarily termed the "unconscious" but which by analogy with the body structures I like to speak of as the "organ of the unconscious." In this field we have discovered many things, some of which at

least have been vaguely known for a long time but which now, upon rediscovery, receive a new lease of life and a greater understanding. We have discovered man more truly as he really is rather than as we previously knew him, disguised by the veneer of civilization and culture. We have realized the necessity of considering the origin and the historical background of man as he appears at present; and while this examination has not deprived man of his many excellent qualities, it has taught us that he has potentialities which in the past we have never wished to recognize, much less to dwell upon. Above all, it has taught us that we are all kin in a much more concrete way than we had heretofore supposed, that our respective pasts are so long that our presents are inconsiderable as compared with them, and that this past is what we possess in common; in other words, that the differences by which we know one man from another, our friends from our enemies, people of different races, religions and languages—all these differences, the individual differences of the psychologists and these others, are inconsiderable as compared with our likenesses which have been laid down as permanent possessions as the result of millions of years of preceding life experience in conflict with a hostile environment, and that the reason that we are here to-day is that by and large this struggle of life as it has pushed its way upward through the past eons of time has been a successful one because those results of experience which have had survival value have been somehow preserved. Let me dwell briefly upon some of man's qualities as displayed by a search into his unconscious motives, and let me give some examples to illustrate what I mean.

In the first place, it is essential from our point of view in questioning the organism to realize that those questions must be addressed to the organism-as-a-whole rather than to some of its differentiated structures, and that what we need to know about are the purposes of the organism in the broadest possible terms and how these purposes are striven for and attained or missed, and it is only at the psychological level that these purposes manifest themselves with any clarity. If we vision the organism battling with a hostile environment we can see that its most general purpose is to succeed in the battle, by which is meant to preserve its own life, to perpetuate the life of the species, and perhaps less important but nevertheless to be considered at least in the realm of human life, the gaining of some form of pleasure, happiness, satisfaction, self-expression as a result of the conflict —the seeking of pleasure and the avoidance of pain is the simple way of putting it. In making this statement I have already differentiated two great regions: the environment, or the world without, the most important component of which for man is his fellow men; and the world within, the mind, with its ideas, its feelings and its tendencies expressed through the body. The conflict of the organism with the environment is a conflict that has its reflection or repercussion in the world within, so that as we expect antagonisms without so we must expect antagonisms within. We are dealing here probably with a concept as generic in type as that of the energy concept at the basis of the law of action and reaction. Life goes forward as the expression of conflict and continues as long as the balance is on the side of success.

The reciprocal relation of the world within and the world without is the most significant feature to which I wish to direct your attention. In the first place, it is fair to assume, as I already have, that in the history of man's development his successes should somehow be preserved. The main features of the conflicts of the past have been the building stones with which he has scaled the heights, and so it is not strange that we should find the remnants and indications of these important events laid down in the structure of the mind as well as we see them laid down in the structure of the body. We have the indications, the bodily history preserved not only in the embryology of man but also in various developmental anomalies and peculiarities with which we are all more or less familiar. There is as truly an anatomy and a physiology of the mind, represented by its structures and functions, as there is an anatomy and physiology of the body; and there is as truly a genetic psychology as there is an embryology; and there is as truly a paleopsychology as there is a paleozoology or a paleobotany. As there are archaic structures in the body so there are in the mind, and when man comes to civilization he carries with him all these indications of his past at the psychological as well as at the somatic level. So we see from this point of view that all the forces of the cosmos as they have been concentrated in the conflict between the organism and the environment have resulted in definite structures of mind and body which have been preserved, in miniature as it were, and give us the picture of an organism which at each moment is reacting with the precipitates of its entire past to the present situation. These purposes of the organism as we see them represented when we look at it in this way orient us in an entirely different way towards the problem of man. Instead of viewing him from a purely descriptive level there now inevitably come to the forefront meanings and values. Life does not present simple, direct situations capable only of a single interpretation. We are always torn between our instinctual tendencies, on the one hand, and the necessity for their adjustment in a satisfactory way to the situation as it exists at the

moment. Here we are confronted with questions of choice, matters of judgment, and meanings and values are the deciding factors. It is inevitable, therefore, as you see, that man's desires should come up against, as it were, all manner of obstacles in his environment, and that therefore his main objective in life must be to modify that environment, to bend it to his purposes, and in this way to bring to pass his desires. Here we have at once an explanation of the growth of science, for science has this objective above all others; and not only that, but we have an indication as to why different individuals choose different careers, for it is because they each of them are different that they bring a different pattern of personality to bear upon their present problems and are driven to their choice by a necessity resulting from the clash of this different pattern with the forces with which it is in conflict. So we have a right to suppose that the reason why a man becomes a chemist, why he becomes a physicist, why he becomes a biologist, are all questions that can reasonably be asked of the organism, and that we may expect to find answers to these questions in the make-up of the individual concerned. In fact, we may go still a further step and say that man's interpretation of his environment is dependent upon what he wishes to accomplish. In other words, he interprets his environment dependent upon how he intends to react to it. For example, a book to one man is something from which he may obtain certain information, to another man it is a volume which replaces one that has been lost and therefore completes a set, to another it is a beautiful thing which will look well in a certain bookcase, to another it is something to be reproduced by the processes of printing and binding, and so on—to each one the environment is perceived and apprehended in accordance with the ways in which he would act upon it and mold it to his purposes. So that we see man coming to the problems of his life with the accumulations of the past and meeting them in accordance with the purposes which he desires to bring to pass. That "man is the measure of all things" is therefore no longer just a phrase nor yet a commonplace, but is a fact of tremendous significance and importance and one that must fundamentally modify our way of thinking of him in all his different aspects. You will see, therefore, that I think of man, an individual man, for example, as a point where at the moment the forces of the universe are nucleated in a particular way, and where they are working themselves out in accordance with certain laws. Man is one of the products of the cosmos, he is not something which has been added to it; and therefore, as we might expect, he expresses within himself the laws which operate elsewhere in the cosmos. The functions of mind can be thought of best in terms of energy, although at present we are unable to differentiate and separate this energy and measure it. I can not, however, but feel with the author who says: "Considering the impossibility of defining the exact line of demarcation between animate and inanimate matter, it is astonishing to find so much stress laid on the supposed fundamental difference between vital and non-vital phenomena."[2] Man thus becomes the final integrator of all the laws, physical and vital, that have led up to his development and which he manifests in the very fact of living.

Most physical phenomena, as I have already indicated, can be expressed in the framework of certain dimensions: the large masses with which the astronomer deals, the smaller masses familiar to the physicist, the still smaller ones of the chemist, and then the world of the sub-atomic which is beyond the field of vision and in which still different laws seem at the moment to be possible, where perhaps cause and effect, as we generally know them, no longer rule, where the principle of indeterminacy takes the place of that of determination, then there is the so-called "world of neglected dimensions"—with which words the colloids have been referred to. And then we get finally to the field of psychology in which dimensions as we ordinarily know them do not seem to be applicable in the ordinary sense, with the exception perhaps of the dimension of time. Here we are dealing in a field that is quite unique, except that whatever occurs in this field occurs in accordance with the laws of the field. Whatever finds its way into the psyche is governed by the laws of the psyche, but because it has those characteristics which defy measurement in the ordinary ways with which we are familiar it is quite probable that it may require modifications in methodology which will have to be developed in order to wrest from it its secrets; and in one respect this possible difference of methodology will have to be borne in mind, and that is in the old sense that man in order to understand himself is in the unique position of being both the observer and the observed. He has, so to speak, to lift himself by his own bootstraps. This has always been a vexatious, and, so far as I know, an unsolved problem. It has been written of, thought of and argued; many suggestions have been made but none of them satisfying. I only have this to offer in this peculiar situation in which man finds himself when he wishes to understand himself, and I refer to what I have already said about the way in which man perceives the universe about him, namely, in accordance with the plan of action which he intends to develop with reference to it, or, in the words of Bergson,[3] "our perceptions give us the plan of our eventual action on things."

[2] Stephane Leduc, "The Mechanism of Life."

By development, by history, from any way we look at the organism, it is essentially a going concern. Meanings are without significance except as they express themselves in actions. Perceptions are without significance unless ultimately action results from them. Our knowledge, so-called, of the world about us, is a knowledge which has developed and been organized for the purpose of our actions upon that world. If, therefore, we are content only to think about and argue about the difficulty man may have because he is both observer and observed, we will find ourselves with an unsolvable problem from which we can not extricate ourselves. If, on the other hand, we undertake to carry out the design on which we are built, if we yield to the demands of our structure, if we undertake to do something about these various problems, somehow there will be wrought through the strange alchemy of life results which will advance our knowledge and increase our effectiveness. While this may seem the best we can do it is not enough. We must not permit ourselves to be stalled into inaction by the sterilizing magic of words but must overcome such difficulties by attempting to solve the problems that life presents to us by doing something effective about them.

Now let me briefly indicate some of the more outstanding contributions that psychiatry has to make in regard to the principles I have outlined. I spoke of the reciprocal relations of the world within and the world without. It is quite understandable that when the world without is destroyed chaos should reign within the mind. At times of great catastrophes such as earthquakes, and especially, as we have seen in the world war, when enormous shells explode in the neighborhood of an individual, we find the result to be a feeling of utter helplessness as all the usual and familiar stabilities of the world disappear. The very earth itself trembles and no longer offers a stable foundation. The enormous destructiveness makes our lives so insignificant that complete annihilation seems imminent. Terror seizes the victim, and complete confusion reigns in what had previously been an orderly world. It is perhaps not so understandable, except in the face of an acceptance of the idea of reciprocal relationship that I have mentioned, that, when the world within is threatened by disease, when in fact as a result of progressive organic disease of the brain it undergoes a process of disintegration, under these circumstances such a process should be accompanied by delusions which we term nihilistic delusions and which are expressed by the patient in terms of the destruction of the universe. He feels that all things about him are crumbling away and disintegrating. He feels the apprehension, the fear, the confusion, which such a disintegrating universe forces upon him. And so he comes by a different route to the same net result reached by the individual in the midst of a great catastrophe.

On a par with these phenomena are the much more familiar symptoms that we find very frequently in the very early stages of mental disease. I refer particularly to the symptom that we call "depersonalization" but which is more commonly referred to as "confusion." In this state of mind the patient feels strange, as if something had happened to him. He is uncertain, acts perplexed. The feelings of strangeness may seem more particularly as if they applied to himself or to the world about him. He has lost the feeling of definiteness and security with which he contacted the world previously. He feels perhaps that he is not himself, he has lost his feeling of personal identity. These symptoms can be understood in the light of what I have just said about nihilistic delusions when it is realized that we think of psychoses as being, in the first place, a retreat from the world, and, in the second place, a distortion of that world. Therefore you will see that under these circumstances the patient who is moving into a psychosis develops as his first symptoms disintegrations of a mild degree of both the world within and the world without. There reciprocal relations maintain as they did in the more malignant situations referred to above. One does not change without the other.

In the face of these principles, too, it is not by chance that, in the conditions which we term "mental disease," the method of thinking, the forms and structure of the thought processes and actually to a considerable extent the very content of thought itself take on the characteristics of the thinking of children and of primitive peoples; for, after all, has not man passed through the period of childhood, both individual childhood and the childhood of the race, and is it strange that he should carry with him characteristics pertaining thereto? And when disease involves his mind we find that these characteristics appear as symptoms. This change is expressed by a movement in the direction away from the reasoning, differentiation and abstraction of highly developed thought processes toward forms of expression in which feeling, concreteness and perception dominate.[4] If we examine such an organic disease of the brain as aphasia in some of its forms we may rather unexpectedly find the same principle to hold. We have been so imbued with the localization theory of function of the last century that we are hardly prepared for such phenomena. We have been thinking of cortical cells as if they had only specific functions to perform and the

[3] "Creative Evolution."

[4] Alfred Storch, "The Primitive Archaic Forms of Inner Experiences and Thought in Schizophrenia."

destruction of these cells would result in the destruction of these very specific functions. This concept is not by any means wholly wrong, but it is only a partial truth, for when we do get aphasias as a result of destructive processes of the brain we find that we do not have the simple dropping out of exceedingly concrete and well-defined functions, but a regression to a simpler way of expressing ourselves through the medium of language. Perhaps no function illustrates better than language the fact that man is not the result of a process of simple addition in accordance with what I have described as the mosaic theory of structure. Language, like the simple reflex, is by no means an isolated or rigidly circumscribed phenomenon. As "the reflex," in the words of Coghill,[5] "is in its genesis dominated by the total behavior pattern," language is an expression not of a few closely related cortical brain cells but of the whole individual, and when the mechanism by which this function is translated into speech is interfered with this function as a whole drops to a lower and more primitive level consistent with the reduction in complexity and the simplification of the remaining available anatomical structures and physiological mechanisms. Such examples as these might be multiplied indefinitely, but I have simply quoted these two to indicate how far flung are the possibilities of the interpretation of human behavior and the nature of man by way of the route of psychopathology.

Let me reverse the direction of my thinking and, instead of speaking of what may accrue to the understanding of man by way of psychiatry, indicate some of the things which the psychopathologist, particularly the psychotherapist, may hope for from the field of general science, particularly biology. In the experimental work of the biologist certain results have stood out in recent years which appear to have attracted little or no attention from those who are interested in modifying human beings by various methods of therapy. I refer to the experiments which have been made in the modifications of animals by various changes in their environment. Take, for example, the wide variations in appearance which have resulted in the same species of butterflies from living under different conditions of temperature and moisture, types of modifications which have been duplicated in various ways in the laboratory. Think of the control of the sex in pigeons by causing their metabolic rate to vary. Think of the modifications in the development of the claws of shrimp so that the large claw can be at will grown upon either the right or the left side; and the various monstrosities that can be brought to pass in the development of such animals as the fish by the modification of the chemical constituents of the solutions in which they grow and the arresting of development at different points. And most astonishing of all are the transplantation experiments by which tissues transplanted from one region of a developing organism to another develop into the structure that would naturally be produced in this location. What it becomes depends on where it is—its environment.

Such results have served to change our way of looking at the problems presented by heredity and environment and we have come to begin to think of these two terms as what I call ambivalent opposites, as only two different aspects of the same process. The significant thing is that when we have hereditary structures hereditary possibilities can only be realized in fact if the organism is exposed to the type of stimulus emanating from the environment which causes their development. In other words, a person may inherit a quality without ever showing any signs of it at all, simply because he has never been exposed to the proper stimulus. Assuming that such a characteristic as ability to play the violin were transmitted by heredity, it is understandable that an individual might inherit such an ability but never realize it because he never had a violin to play upon. The significance of these experiments and this new point of view, I think, is very great for human beings; for it means that, as marvelous as the whole integrating process which has culminated in man has been throughout time, resulting as it has in the concentration of all the possibilities of adult realization in submicroscopic packages of probably fairly definite chemical make-up known as genes, nevertheless these minute results of life's experience laid down in these forms can be conceived to have still greater possibilities than have ever been realized as the result of the sort of experiments I have indicated. This all means that whereas our hereditary pattern is fixed to a certain extent, it is only fixed under conditions of life such as we ordinarily meet up with and that entirely different conditions might result in the realization of possibilities undreamt of. A whole new field of possible therapeusis is opened up here, the value of which experiment and experience alone will determine. The main point to be emphasized here is that the advance of science breaks down limiting traditions, and in this particular instance limiting traditions which are preserved by and imbedded in our language; for such a concept means nothing more nor less than that what is ordinarily recognized as constitution and generally thought of as unmodifiable is transferred to the category of acquired characters which can be changed by

[5] "Individuation versus Integration in the Development of Behavior."

experience. The supposedly irreversible has been found to be in fact reversible. If this is so—and I merely put it forth as a hypothesis, then surely man may look forward to untold accomplishments in the future which he has a right to expect will equal or exceed those of the past; all of which is rendered possible by the fact that he presents to the world into which he is born a concentrated solution, as it were, of the possibilities of adjustment to the environment which he has acquired through the millions of years of the past experience of life, which possibilities are ordinarily only partially and inadequately realized.

One of the characteristics of man which is exceedingly significant for this process of continuous adjustment is his very highly developed self-regard. In the old medieval universe in which he lived he was its center and all the rest of creation existed to minister to him and to emphasize his importance. When the teachings of astronomy overthrew this geocentric universe man resented it tremendously and fought these ideas vigorously until, convinced against his will, he had to accept the facts; and then, in order to compensate himself for his loss of self-esteem he began to acquire a knowledge of this universe, to master it in this way, and hence he became an astronomer. When the theory of evolution threatened man's dominance among the animals he again resented being pulled from his pedestal, but when he had to accept these facts he reacted by the compensatory mechanism of mastering this new world in which he found he had to live, and he became a biologist. When the more recent advances in the psychology of the unconscious demonstrated that each individual was just like everybody else, that we were all turned out of a common mold, that our past was of such infinitely greater significance than what we had acquired in our short lifetimes, that our personal and unique qualities were negligible, man again resented being merged with all his fellows; but when he had to accept this fact he began again to protect himself from the feeling of being at a disadvantage in this new world by mastering the facts of this new science, and he became a psychologist. In each instance when his dominance by birth and position was threatened he compensated by learning to master reality by knowledge and thus reconquered his dominion but on a different plane. And thus as time passes his possibilities constantly increase. He becomes more highly differentiated, to be sure, but the significance and the value of his differentiations are dependent upon the original source of all energy, just as the blood supply of the tiniest capillary is dependent upon the reservoir of blood in the heart. This reservoir makes him kin to the whole world and its existence expresses the fact of his capacity for accumulating unto himself, in miniature, the possibilities of his entire environment.

This thesis, of course, might be carried out to almost any conceivable lengths. The comparison of man's thinking, as it is reduced to more primitive levels, with the thinking of children and of primitive man, is full of interesting material. We see our patients definitely expressing themselves in their behavior and their language by animistic mechanisms. We are familiar with their beliefs in magic and in the supernatural, and in the more malignant types of disorder there appear strange and weird forms in the content of thought which can only be likened in their archaic characteristics to the fossils we are familiar with in the field of paleontology. Similarly, if we wish to develop our thought along the lines of what years ago Roux called his "developmental mechanics," I am sure we could find many illustrations at the organic level that would bear out what has been said. The struggles between the different parts of the organism are as real as the intrapsychic conflicts, and the principle evidently holds that the pattern of differentiation is dominated by the total pattern of the organism as expressed in such terms as Lashley has used, for instance, with regard to the central nervous system when he speaks of the equipotentiality of the brain cells, by which he means that aside from their specific functions they have certain general functions which we may conceive to have been the basis from which the specific have differentiated. All these concepts assist us to an understanding of ourselves. They enable us to appreciate the significance of the utter selfishness of the individual organism, of the aggressive tendencies which it is willing to utilize for its self-aggrandizement, and of the usually bewildering fact that an individual may hold two mutually exclusive opinions about the same question at one time without one seriously interfering with the other. We can understand, too, why, for example, we find the psychiatrist writing about such concepts as time and space,[6] which used to be considered exclusively matters for investigation by the physicist and speculation by the philosopher. And, finally, we must appreciate that the peculiar constitution of man is his key to the understanding of nature or, perhaps it were better said, to the understanding of nature as he comprehends it. All of which is perhaps not especially new or startling, but its significance, to my mind, lies in the fact that no single scientific discipline, at least in the present century, has offered so much by way of promise in the solution of these vexatious problems as psychiatry. It will remain to be seen how satisfactorily these promises will be realized in the future.

[6] Paul Schilder, *Psyche*, 14: 124, 1934.