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EXPANDING CONSCIOUSNESS AND DEMOCRACY[1]

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FROM the point of view of a student of evolution it would seem that much of the trouble in the world to-day results from the age-old conflict between two major impulses of life. These are the impulses of each individual organism to live its own life in unhampered freedom, and the impulse of each individual to seek association with its own group. Life tends to vary, to differentiate, to individualize, a tendency which is in continued conflict with the "herd instinct," the impulse of individual organisms to come together for protection and aggression.

Evolution implies that through the long history of life new types have come into existence through descent, with slight modifications, of new individuals from pre-existing individuals. Life would long ago have vanished from the earth in the face of the difficulties and dangers in its environment, had it not been for this overwhelming urge of each individual organism to live and to reproduce.

While, however, life was limited to one-celled and self-sufficient organisms, there could be little advance in evolution. Later single cells came together to form many-celled larger units, with their enlarged possibilities. In each of these the component cells divided the labor of preserving the larger organism, and hence the existence of each individual cell came to depend on the existence of the other cells. And it is possible that in these larger many-celled organisms may have arisen the first diffused beginnings of the impulses which are sometimes classified together as the herd instinct.

From such cooperative beginnings the evolutionist traces the long succession of increasingly compact groups up to their culmination in the swarm, the herd,

[1] Address of the retiring president of the Boston Geological Society.

the pack and, in man, the tribe and nation. An underlying principle in this evolution is that "in union there is strength," a greater probability of survival of the larger unit, whether the union be physical, instinctive or consciously social.

All such growth, however, of the "coming together" impulse brings about as a necessary corollary a *subordination* of the more personal interest of the individual. The later developed unity frequently asserts its interest at the expense of the interest of its components. An animal in a trap may gnaw off its leg, itself composed of myriads of cells, in order to save the larger unit. The non-working drones are killed by the workers in a hive. Offending individual man is put in prison. In such cases the individual self-preservation instinct must subordinate itself to the impulse to preserve the herd, the larger unit.

Thus, throughout this long course of evolution, may be seen the expansion of organic life, with its attendant first beginnings of consciousness, from the first single cells, with their ruling impulse to live as individuals, through the many-celled organisms, and on to the larger groups where the interest of the larger cells is at times completely dominant over that of the individuals.

In conjunction with the evolution of the instinct for self-preservation, there has taken place a progressive expansion of the reproductive impulse, especially into the parental instinct. The more lowly animals of the Paleozoic gave no care to their offspring after the eggs were laid. Such increased care for the next generation appeared with the advent of certain fish, insects and birds and the mammals of the Mesozoic, if we may judge from the behavior of the closest modern descendants of these groups. The parental instinct then enlarged its range of expression from the immediate offspring to other members of the herd. In more advanced man the love of children and neighbors begins to enter the more *outlying* fields of the weaker members of his species, the under-privileged and the less normal.

Thus as the student of evolution looks back over the series of living forms that have populated the earth for a billion years, he sees them controlled by impulses that foster both variation and protection, radicalism and conservatism. He may consider these instincts as expressing a gradual expansion of consciousness. During this evolution, consciousness, at first expressed simply as awareness, has expanded from the individuality of the single cell, through that of the many-celled individual, to the enlarged sense of the unity of the group composed of many multicellular organisms. The behavior of the higher organism depends on a series of impulses that becomes more and more complicated—the impulse to preserve its own life at all costs coming into conflict with its impulse to preserve and care for its young and with its impulse to enter into large groups for the aggressive and defensive benefits it receives from such association in the group. In the lower animals, as, for example, in insects, there is little conflict in the group because there is little individuality. But, in mammals, an increasingly sensitive nervous organization and progressively larger brains introduce the capability for more varying individual action.

Insects are encased in a completely enveloping external skeleton of chitin. This necessitates molting for growth and restricts the possible size of the organism. Moreover, chitin is easily modified into organs specialized to the needs of each species; only a small amount of intelligence is required to use these implements evolved for each particular use. Hence the reaction of each insect to any particular environment differs little from that of any other insect; it has specialized tools all ready to meet it.

In contradistinction to the insects, the vertebrates possess an internal skeleton, to the outside of which the muscles are attached. Vertebrates can thus grow without molting and can reach a much greater size and develop a much more complex nervous system. The internal skeleton is not in direct contact with the environment, nor is bone so easily modified or so capable of being fitted to such a variety of uses as is chitin. Not having been able, accordingly, to evolve a special instrument for each particular environment, vertebrates must modify the *use* of what they have; in other words, they must use their brains to solve each problem. They have thus developed intellect to supplement instinct, which is the sole resource of insects.

As has been seen, increased use of the brain results in a greater variation of action, in increased development of individuality. But when vertebrates began to band together for getting a better food supply and better protection of the young, they had to give up a certain amount of this individuality of action. The strong herd of herbivores may eat almost where and when it will, but the individual must secure its food in close competition with the other members of the herd. The carnivore pack can capture larger and fleeter animals than can each member of the pack alone, but they must compete with one another over the captured prey. Such aggregation of individuals into herds or packs is characteristic of the higher mammals, including the higher Primates, to which man belongs. A tribe can survive where a single family can not. An aggregate of tribes, or nations, has greater survival value than a single tribe; it tends to subordinate intertribal warfare to the competition with other nations. The next logical step would be the international Earth Nation which should tend toward

subordination of warfare between nations to the problems of cultural survival and improvement of all the peoples of the earth.

Consciousness, starting thus as the awareness of an organism to the individual problems of food supply and self-preservation, expands to the increased instinctive care of the young. Because of their internal skeleton, the vertebrates have found the need of increased use of the brain to solve their increasingly complex problems of survival. This increasingly larger brain in the higher mammals and the necessity for individual decision at frequent intervals result in the increasing emergence of a certain faculty of curiosity in the higher mammals. When the individual is somewhat released from its necessary concern with the getting of food and the avoidance of enemies, curiosity about the environment grows. This is well seen in cattle, horses and the mischievous monkeys. And, finally, the philosophic and scientific curiosity of man results in further accentuating the variations among individuals. Such variations are still in conflict with the ancient and powerful instincts for food, safety and family. Fears and hopes connected with these self-preservative instincts may be so increased by education or propaganda that for a time individual man may be willing to permit his thoughts and actions to move in only directed grooves. Yet even in such times of public fears and stresses and emotional urge, there always remain some individuals whose minds can not be kept along ordered grooves; they persist in seeing avenues to be explored along forbidden lines. Such men formed the majority of immigrants into new territory. They were the pioneer philosophers and scientists at times when it was dangerous to think along new lines. A nation may be kept in an unchanged condition only by banishing or killing these mentally restless individuals.

To recapitulate, when man comes to look back upon the way his animal ancestors have traveled, he finds in himself the field of conflict between ancient instincts. He must obey the impulse of self-preservation. He feels the urge to protect his young. He is impelled to join with others of his species for protective and offensive advantages. His tendency to variation as an individual must thus be at times subordinated to the interest of the group. In human affairs, as in geologic processes, centrifugal and centripetal tendencies must be in a state of constant readjustment.

Heraclitus of Ephesus, some twenty-five centuries ago, in his statement, "Panta rei," expressed the universal law of movement, that all things are being perpetually transformed into new shapes. The geologist sees the wearing away of solid rocks, the removal of the dissociated matter to lower levels, with the consequent lowering of mountains and filling in of basins. The final goal of such processes would be a featureless landscape. Such a final state of quiescence, such cessation of the labor of running water, has never been attained, for new lands are being raised and new mountains are formed. Our backward glance over many millions of years of earth history shows these opposing forces of change to have been constantly operative.

The biologist sees the gradual dissolution of the physical forms of organisms into the featureless goal of the physical elements, but throughout earth history this goal has never been attained for all animals at any one time. For death and dissolution of the old forms are always accompanied by the birth of new organisms and their struggle to maturity and old age.

Thus neither life nor the earth upon which it exists is static. There are always two opposing forces at work—one tending toward a featureless order or death, the other towards diversity, disorder.

This universal law of movement is operative in man's social organization in all its forms from the home to the nation. We see here, too, a constant struggle between diversity and featureless order. Man's large and active brain produced the printing press, which enabled man to make and preserve records of what his immediate forerunners have done, thus giving to each succeeding generation a fuller social inheritance and a closer contact with the present world. Such resulting reaction of mind on mind has brought about the extraordinary increase in diversity of modern life and its accompanying subdivision of labor, a diversity that inevitably produces inequalities in the social structure. This has naturally called forth a demand for a greater measure of order among many of these conflicting diversities. In the attempt to meet this demand we witness to-day experiments in various forms of autocracy and regimentation. In any such panacea, whatever tends to reduce diversity of thought weakens the long-time vitality of the group or nation that tries it; it is, by analogy with geological and biological processes, a step towards its final dissolution. In the words of A. G. Huntsman, the perfect goal in a social structure would seem to an evolutionist to be the welding of the fullest possible diversity into an orderly, harmonious whole. In the extent to which this problem is solved is shown the mental caliber of the social group.

The many forms of government in the modern nations may be classified according as they emphasize the dignity of the individual, that is, the contribution that varying thinking may give, with the resulting tendency toward diversity; or, on the other hand, as they emphasize the enhancement of the state or nation, with the consequent tendency toward stagnation and the ruthless subordination of the individual toward conformity with one fixed ideal.

To the student of evolution who looks back over the

history of the earth and its burden of living forms, who sees in both geologic and organic evolution the never-ending conflict between forces making toward diversity and forces making toward order and conformity, the ideal government would seem to be democracy. Life would be impossible in an anarchy, where each individual conducted his life in entire disregard of the needs of the larger group. Full creative life is equally impossible in a totalitarian government where all human activities must conform to a single central policy. In democracy alone, where freedom of thought is safeguarded and allowed expression in freedom of speech and of the press, and where, at the same time, freedom of action is, to the measure of the general good, controlled by the people themselves—in democracy alone may man evolve most freely. New thoughts can be tried out for their survival value in private schools and colleges, in cities and in states. It is these new ideas that constantly add to the richness of the nation and to the fullness of life of its citizens. Of course, in this very strength of democracy lies its weakness; this great and increasing diversity of life must be made sufficiently orderly to function and to protect the numerous minorities as well as the majority whose opinions dominate at the moment.

In the French Revolution the ideal was Liberty, Equality and Fraternity. At Gettysburg Lincoln reaffirmed that our nation was conceived in liberty and dedicated to the proposition that all men are created equal. These are the two eternally conflicting principles, liberty and equality. To make men and women equal in all things—houses, goods, education, length of working time—compulsion would be needed, an outside dictating authority. Some do not wish a college education, ideas of a desirable house differ. Some wish to carry business thoughts beyond the day into the night hours. To make all equal in all respects, regimentation would be required, and we would not have liberty. On the other hand, liberty for each to do as he wished all the time would interfere with the liberty of all the others, and hence there would result no equality. Yet the future of any nation depends upon these liberty-loving, mentally restless individuals. New application of well-known principles may be developed along directed grooves, but for the envisioning of new truths, the development of entirely new outlets for human energy, the individual must be free to think along any line and to try out these thoughts with his peers.

Democracy stands ideally for both liberty and equality with their unending conflict and unending readjustment. Democracy solves its issues by majority rule. At times this rule may be wrong, but experience and education can, through the pressure of a minority group acting on public opinion, bring about changes, because it is of the essence of democracy that smaller groups should, through freedom of speech and freedom of assemblage, have the opportunity to present their ideas before the groups that may at the time be dominant. It is a slow process, but the results are stable. Absolute truth in human affairs is not revealed to any one; it must be approximated through intellectual cooperation, and that means freedom of speech and of the press. It means a thorough appreciation of the dignity of the individual.

What definition of an ideal government could be more in conformity with the spirit of evolution than that given by Dorothy Thompson in her discussion of the meaning of democracy?

> Democracy for most of us is not an ism. It is a way of life. It does not represent any rigid form of state or national organization. It is something constantly developing and unfolding, changing from day to day, making mistakes, advancing in this direction and retreating in that, but always animated by a few fundamental ideas: that men have a right to live their own lives provided they don't tread too heavily on other people's toes; that the state is not endowed with any divine rights but is merely a useful instrument invented by men to serve them . . . that the individual shall be judged, not by his race, background or national origins, but by his human qualities of heart and mind and skill; that laws which every one must obey shall not be arbitrarily made but should be the result of debate, deliberation, consultation.

What better than democracy can aid the evolution of the life that for a million years on earth has been expressing itself in human form?

To briefly summarize: Through two billion years of evolution physical forms have been evolving. During the comparatively recent years of this evolution the human body has come into being, with its burden of animal appetites and instincts, with, in addition, its tool-making hand and its larger brain and nerve mechanism for conscious thought.

This animal, awaking into self-consciousness as man, finds that his life is the product of two sets of forces, first, forces outside himself, his environment inorganic and social, and second, forces within himself, the bundle of forces with which he is born, that constitute himself—the *body* with its appetites and needs and governed by a set of instincts, all inherited from a long line of animal ancestry, and that which takes *cognizance* of all this and knows that it is in control. Man wakes to find himself whirled through life, drawn by his appetites and emotions, but because he is man, the thinker, he realizes that it can be increasingly in his power to control these appetites and to some degree control the activities of his life.

He sees around him other thinking individuals, with the same instincts and emotions, linked with him in

family, community, state and nation, each striving to live a full and safe, that is, a happy life. He sees other groups of individuals forming other nations of which the individuals also wish to lead happy lives. He shares with all the inheritance that accompanies the physical body, as, for example, such emotions as intolerance and belief in force; he finds that all are subject to the passions of the pack, as seen in mob violence and in heresy hunting spasms. Accompanying these impulses, he sees also emotions of a kindlier nature, sympathy, forbearance, protection of the weak, all growing out of the parental instinct. These, however, were evolved later in time than the preceding ones and are at times submerged by the older and hence stronger emotions.

In some nations he sees where certain groups have made use of force and intolerance to become supreme, with at times a single man becoming dominant over the thought and actions of a nation. In other nations he sees a frequent shifting of government, as one group after another succeeds in seizing control by armed force. And finally, he sees the nations in which control of any group is decided by majority vote.

As man views such democracies, he realizes that they are succeeding only because education is required of all, and because there is freedom through press and discussion for the expression of varying views. It is this accessibility to varying views and to consequent possible change that gives the democratic form of government the vitality of an evolving organism. Here may humanity find freedom for expansion in the limitless realm of the human spirit, new thoughts ever leading into new activities and a continually richer life. Expansion of consciousness in man can result only from such never-ending compromise between liberty for each and equality for all.

"HOW SOON WILL THE 'MANUAL' BE DONE?"[1]

A PLEA FOR SOME UNDISTURBED MOMENTS

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IN 1829, in edition 5 of his "Manual of Botany," Amos Eaton wrote: "Many vain botanists are continually in search of new species; and their vanity leads them into gross absurdities. . . . There is not [note the singular verb], probably, 50 undescribed species of Phenogamous plants in the United States—perhaps not one species east of the Mississippi." Amos Eaton believed in a simple system of classification, which still prevails in some centers, arranging his genera (without designation of families and orders) in strictly alphabetical sequence. In 1873, William H. Leggett, then editor of the *Bulletin of the Torrey Botanical Club,* wrote in volume iv (19, 20): "Many causes have led botanists in America to give their attention more particularly to the systematic part of the science; but this field has been so well worked, and is so full of workers, that there is little room for any new comer to add much to our knowledge."

Amos Eaton closed the door on further discovery of plants in the United States 109 years ago; Leggett again shut it 65 years ago. Nevertheless, here we are assembled as the American Society of Plant Taxonomists. In the southern idiom: "Wha' for are we all here?" Can it be that we are here simply because we are hungry?

I find myself retiring president of one of the least organized organizations in the country. When I was told that you had elected me your president, I was specially instructed that I must be wholly passive and "let George do it"; I was merely an ornament to be displayed at dinner after you had all presumably overeaten and were not too wide awake. In other words, the president of this organization without organization becomes the retiring president upon election. Retiring, according to the dictionary, means going out of sight or notice; shrinking from publicity; subdued.

There are advantages to these conditions. For instance, when the botanists planned to meet in Ottawa last summer I tried to make it clear that I could not be there, that my obligations in Cambridge and the special field-work I had undertaken in Virginia would make it out of the question. In the old days if one wished to become invisible it was necessary to go out in the moonlight on St. John's eve, and, while reciting the Pater Noster backward, to gather either the seeds of St. John's wort or "fern seeds." But now the process is more subtle. One needs to become a retiring president. At the time of the Ottawa meeting I was either in Cambridge or in Virginia (I haven't verified the dates). But as a retiring president (or one who shrinks from sight) I seem to have been present, though invisible, at Ottawa. I didn't know it myself; but the official report which I read in SCIENCE definitely stated that I was there and that I presided at one of the sessions.

But to come to the main theme. My text this eve-

[1] Address of the retiring president of the American Society of Plant Taxonomists, Richmond, Va., December 28, 1938.