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## THE VARIETIES OF TRUTH<sup>1</sup>

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"The meaning of a word is its use in the language."  
—Wittgenstein.

"Say what you choose, so long as it does not prevent you from seeing the facts. (And when you see them there is a good deal you will not say)."—Wittgenstein.

"It is not an exaggeration to regard all knowledge as really biological, since the process of knowing is a life process which is basal to every art and its practice, to every science and its application, and to every philosophy and its exposition."—Lorande Loss Woodruff.

"Every plank of [science's] advance is first laid by . . . the spontaneous conjectures of instinctive reason."  
—Charles Sanders Pierce.

"If man is the product of biological evolution, then all of human nature must be explained in evolutionary terms, including ethics, aesthetics, religion, philosophy, science and politics."—Poiré.

"Why, all the Saints and Sages who discussed  
Of the Two Worlds so wisely—they are thrust  
Like foolish Prophets forth; their Words to Scorn  
Are scatter'd, and their mouths are stopped with  
Dust.

"Myself when young did eagerly frequent  
Doctor and Saint, and hear great argument  
About it and about: but evermore  
Came out by the same door wherein I went."  
—Omar Khayyam.

"Whereof one cannot speak, thereof one must be silent."—Wittgenstein.

What I shall say in this essay is based on fifty years of wondering "What did God mean by creating the World, the sea, and the desert, the horse, the winds, woman, amber, fishes, wine?" During my thirty years of association with scientists, mostly biologists, I have come to realize that many do not often think about the Baroness Blixen's question. They do good, even outstanding work, without considering the implications

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of or the logical bases of it. This, I insist, is a luxury we can ill afford.

I intend to discuss, in these times of trouble and crises, the nature of science and, more importantly, its place in the scheme of things as they are, when we are all blessed by the ancient Chinese curse: "May you live in interesting times!" And the curse was not intended as a blessing. What follows, is what I have come to accept about these matters and I do not, then, propose to document what I say. It must stand or fall on its own feet with only me to blame.

And I approach the topic with the profoundest pessimism: a feeling that must be akin to that felt by a soldier who knows he has been mortally wounded after the war is lost and the truce treaty signed. But being a man, and man being what he is, I must do what I must.

I have chosen to entitle this essay as I have because I think that what men believe, what they accept as "truth", may profoundly influence, even at times, direct, their behavior. As scientists, we must be concerned with the nature of science to be "good" scientists; as social animals, the time is long past when we could retire behind a mask of disinterested purity and ignore the social implications of our work.

As an aside, that time never existed. It is a myth inherited from the time when scientists claimed a pursuit of science for truth's sake, that is scientists' sake, and an ethical neutrality, in order to overcome the resistance to their entry into the protected halls of Academia and to protect themselves from the furious onslaughts of the non-scientists who perceived clearly enough the damaging implications of science for the core of commonly held economic, social, ethical and religious views of the time. Scientists today must sell their wares in the market and subject their generalizations to debate in the forum. Though withdrawal to the ivory tower may be a necessary protection for the scholar in the developing of his ideas, ultimately, for the social good, we cannot afford "art for art's sake" (a horrible "dilettantic" view), nor science for science's sake.

The varieties of truth, truth itself: what are they? First, they are human inventions, flawed by the nature of an animal only recently descended from apes. This is not Huxley's "nothing-but" fallacy: man's powers of symbolization and the use of language (and tool mak-

ing), though clearly the result of purely natural, that is, material, processes through natural selection operating on the evolution of a social animal, set him apart from his cousins, the chimpanzee and the gorilla. But just as clearly, all our concepts, ideas and patterns of behavior are the result of these natural evolutionary processes and we have no appeal to any higher authority to support our fantasies and our hopes, our dreams and our ambitions. There are limits imposed by our neurophysiology beyond which we cannot go.

Strictly speaking only observation reports, statements about what we saw, heard, tasted, smelled, touched, are facts. But, although even they are conditioned and limited by the functioning of our sensory apparatus inherited from our animal ancestors, all human animals equipped with this sensory apparatus, unimpaired in structure and function, will agree on the observation reports, the facts. We can say they are true. From them we make "maps" or "pictures", as Wittgenstein has said, of the world, of reality. But Korzybski points out that "the map is not the territory". The territory, the "reality" behind the facts we cannot reach, ever, and we are by our own rules of validity in logic prevented from assuming anything behind the facts. The facts show themselves and stand alone. It is nonsense to say, as I heard a philosopher say once, that "It is not the thing that is the thing, but the thing that is behind the thing that is the thing."

We cannot get behind the facts. What about the "maps"? Though they are not the territory, they are all we have to guide us. In an earlier, unpublished paper that provided the starting point for this one, I was much concerned about this point and quoted extensively from eminent philosophers of science. Since then I have become more comfortable with the view that was first articulated by Aristotle that there is no absolute truth: "Nothing can be positively known and even this cannot be positively asserted." And I no longer agonize over the logical bases of science and the rules of logic by means of which scientific statements are generated.

We know now what facts are, I've just told you. And we know, in theory, how they are used in formulating scientific statements. Though the latter is not always easy, the process goes something like this. We touch reality at a series of related points, that is, we are presented with a group of facts that are interrelated in some way: in time, space, structural features, behavior and so on. The "map" is too loose a metaphor, we don't simply do the cartographer's trick of drawing lines between these "points". In a fashion that the behavioral biologists have not been able to explain, we invent or create an explanation, a statement, that relates these phenomena in what to us is both a meaningful and testable fashion. This is too elementary, too simplistic. It involves more than the oversimplified view, unjustly ascribed to Francis Bacon, that by marshalling facts, the application of a still unexplained process of inductive reasoning will automatically generate "true" scientific statements, theories, laws, principles, whichever you choose.

Science, then, to paraphrase Woodger, is a set of

systematized statements about some subject matter or other. The subject matter of a science is a group of what to us are related phenomena; the statements are based on empirical evidence—facts—and are testable by reference to other similar or repeatable facts. The statements of science (e.g., the law of gravitation, the principles of evolution) may be so convincingly confirmed that, in practice we accept them as "true": we can base our actions on them. Scientific truth, in this sense, is one variety of truth. But some still insist that there are other varieties of truth. What are they?

Whitehead and Russell attempted to reduce mathematics to logic with, so I hear, some degree of success. But their work and that of Gödel, among other logicians, lead to the conclusion that logic and mathematics are not concerned with truth at all, only validity. God is not a mathematician, in spite of some statements to the contrary. To dispose of this question of whether one can say that the statements, "propositions" is the usual word, of logic and mathematics are true in a hurry, the answer is no. They are valid or non-valid depending upon whether they are derived, according to logical rules that all men are forced to accept, from previously accepted statements ("axioms" is the word for such statements) that by their nature are not susceptible, as scientific statements are, to confirmation by empirical evidence. There is, of course, the empirical science of metamathematics, or metalogic, which studies how such statements are derived. Properly one of the behavioral sciences, metamathematics has been practiced, to my limited knowledge, almost, if not entirely, by logicians in philosophy departments. Such studies reveal clearly that mathematical and logical statements are in the final analysis tautologies: nothing is said in them that is not already in the premises from which they are derived.

The point, however, is this. The way we think, which in turn is determined by the structure and biochemistry of our nervous system, determines the rules of logic that are accepted by all rational men. A logical proposition is valid because I say it is: no one can say more about the question.

What I have just said is not intended to denigrate the importance of logic and mathematics. They are important tools, to return to our metaphor, in the construction of our "maps" of the "territory" that is reality. In other words, in congruence with logic or mathematics we invent or create our testable scientific hypotheses. Enough for what we mean by two varieties of truth: scientific or empirical and logico-mathematical, the latter of which deals, not with truth, but the internal consistency of a set of statements.

I turn now to a realm that is in "the night country", to use Eiseley's term, of man's experience. There is a thing of mine on "Poetry in a Scientific Culture". In it I forgot and claimed credit for an important concept derived from Santayana: Religion is poetry. [All my original contributions have turned out to have been made earlier and better by somebody else]. I shall, on this basis, consider aesthetics and religion together as aspects, in some sense, of a single facet of human ex-

perience and use the blanket-word "poetry" for that facet.

But I must briefly digress now to reaffirm a premise of my argument. The functioning of our brains determines the rules of logic and the facts about reality we accept. The way in which we handle empirically testable propositions and logically valid ones is the result of two types of evolution: biological, that through natural selection of genetic mutations determines the range of potential responses of our nervous system, including the functioning of the higher centers of the neocortex of the cerebrum with which we integrate perceptions, that is "think", including our awareness that we are thinking that is consciousness; and psychosocial evolution in which the word or concept is analogous to the gene and by means of which we learn the experiences of others, by means of which culture is developed and transmitted.

So, back to the argument and poetic truth. We see glimmerings of an aesthetic sense in other animals—the famous colorful compositions, paintings, that chimpanzees seem to enjoy making. All forms of poetry must have evolutionary significance, probably in two ways. I cannot explain this, but from the limbic, the old pre-human, animal parts of the brain, there comes a need for balance, for harmony, for relationship with the other that is the outer world, for pleasure at unexpected but related juxtapositions—a need that must be fulfilled if the organism is an organic functioning whole. Man's affective responses expressed in art or poetry or the appreciation of the beautiful, or in religion as awe of and reverence for the other, would, on this view, have survival value. To feel joy sharp as swords at the sight of a clump of daisies in bloom by a brookside can only make a better man of one.

The second possible evolutionary advantage of aesthetics and religion is involved in their role as a sort of social cement. Both are, by common knowledge, social in nature. Even if the poet is in his life a recluse, he speaks to others, or any evolutionary, biological or psychosocial, adaptive advantage is lost.

One final point on this matter: all men, everywhere, have been artistic or religious or both back to the time of *Homo erectus* and probably to the australopithecines—that half-ape transitional period in our evolution from the common ape ancestor of men and the living apes. To focus on religion as a human experience: it is an integrating force in the individual and society. The psychoanalysts, at least some of them, say that no case of disabling neurotic behavior can be cured without the individual regaining at least some of the religious attitudes of the culture in which he was formed.

But we have not found, so far, in art or poetry or religion anything approaching the sort of truth we ascribe to confirmed scientific hypotheses. In fact, what I have said about poetry constitutes scientific hypotheses that, in principle are empirically testable. An analogy with my analysis of the "truth" of mathematics and logic may hold. Poetic statements, affective responses, are either valid or invalid, depending upon the circumstances and cultural milieu of the responding individual.

Or I can put it this way: the scientist cries to know; the poet sees and cries.

In a healthy man and a healthy society, science and poetry are facets of a single whole. Wordsworth, with all of his antagonism to science, came to say that "poetry . . . is the impassioned expression which is on the countenance of all science". And, as for logic, "only Euclid has seen beauty bare". But Keats was wrong. Truth may be beautiful, but beauty is not truth.

Now I come to the last and, in our present situation, the most important—frighteningly compelling—of the problems that cluster around the question of the varieties of truth. Traditionally, the problem of ethics—What is the Good?—has been considered as outside of the realm of science. T. H. Huxley despaired of finding an answer. His grandson, Sir Julian, has hit nearer the mark. Some modern philosophers of the British school of analytical philosophy have grappled successfully with the problem from the viewpoint of the sort of logical analysis that is Wittgenstein's cure for the disease that is philosophy. Yet, I will contend, only the "philosophically" oriented biologists have struck to the heart of the matter.

The problems, and they are of enormous complexity, that are raised by questions of value and the good, in my opinion, result from an inadequate analysis of what we are talking about. Ethical "precepts" have been thought to be based on absolutes and still are by some. Individual conscience has been held to be an absolute guide to right conduct on the part of the individual. Ethics, as a system of value judgments, has been confounded with poetic, that is, religious values and, as a matter of fact, moral or ethical rules of conduct have been sanctioned by religious creeds and rituals—a powerful pragmatic method of control of most human conduct at most times and in most cultures. But if what I have said about poetry has any merit, these views of what determines right conduct, cannot hold.

There are no absolute statements in ethics, because those ethical precepts that claim absoluteness always, in the final analysis, depend upon the authority of an omnipotent or ultimate supernatural power.

But religion is poetry; the supernatural is the unreachable, if existent, "thing behind the thing" and by definition is beyond man's experience. If it were not it would be part of experience and, hence, a subject for science. Conscience is a set of behavioral rules learned by an individual so early in life that they seem to him instinctive and intuitively correct and carry their sanctions within themselves. So much for the contention that ethical precepts are absolutes.

In almost all societies, certainly in Western thought, but we should exclude Confucianism and perhaps Buddhism in the East, ethical systems and religious practices, as I have noted, have been combined. Religious beliefs have been used to enforce ethical behavior. But this is patently not necessary and Confucianism, as a system of concepts, with none of what we can call religion in it, is an empirical example. Ethics or moral codes are systems that define good or right behavior. There is nothing of the mystical or poetic in such systems. I contend

that what have been called normative or value statements can be empirically based and hence constitute a science of what is correct human behavior.

The reason for this position is simple enough. Man, as an animal, is the product of biological evolution and his biological attributes are those with survival value that have evolved through the action of natural selection on genetic mutations. Man is also a social animal with the biologically evolved abilities of symbolization and communication. It is a truism to say that this allows for the formation of traditions and the transmission of information and cultural attitudes, including ethical precepts, from generation to generation. In other words, psychosocial evolution occurs in ways analogous to biological evolution. Culture, including ethical rules, is subject to natural selection, only the nature of the hereditary materials are different.

I am not going to present you with a scientifically based, e.g., empirically confirmable system of rules for behavior. I will throw out one, the violation of which is the unforgivable sin: man must not overpopulate the earth to the point that he is forced to use beyond reuse, non-renewable resources—I am only concerned with establishing that it can be done, indeed it has been done. And, neither do I intend to say which culture embodies the best set of naturalistic ethical rules: some are demonstrably less adaptive than others and have lost in the competitiveness of the natural selection of psychosocial evolution. Others vary as the physical and cultural environments vary: it is ethically right for an Eskimo band to leave its infirm aged to die, but not for Tennesseans to do so. I do contend that at this time in man's evolution, when one culture is becoming world wide and the only one, that some of the old ethical precepts of our own culture must go and other and better ones must be accepted. In fact, the persistence of man as a species depends upon this.

There is no naïve social Darwinism in my thought—in the long run the exploitation and killing of one's brothers will prove disadvantageous. I cannot go with Ardrey and Morris. There may be no gene for altruism, but there is nothing I know of in man's evolutionary history that implies a genetic base for man's murderous behavior. We are all slightly modified apes; we are not by virtue of our genotypes, predetermined killer-apes. Anthropology, in actuality, implies the opposite. It is man's capacity for coöperation, his affection for his fellows, his emotive response in poetry, his universal need to love and be loved, that characterizes the most primitive men, that is those most like our long forgotten forefathers among the ape-like near men.

But we are far beyond that stage now. Our psychosocial evolution in the realms of science and technology have so far outrun the evolution of our ethical precepts that the times are indeed out of joint and we face the prospect of such a great evolutionary overspecialization in one aspect of our life—technology—that the eminent consequence of evolutionary overspecialization in a changing environment (even though we have produced the changes) is before us—extinction. In the perspective of evolutionary biology, this is no surprising

conclusion. The metabolic by-product of yeast cells kills organisms that produce the substance that gives us such comfort.

If, however, we wish to do other than supinely await such a fate, we must turn to science, to biology, the science equipped to deal with the matter. The sociologists, the political scientists, the economists, the ethicists must realize that they are studying specialized aspects of the biology of a single animal species and orient their studies accordingly. Only against the background of man's evolution, biological and social, can an ethical system that incorporates both man's relations with his fellow men and his environment be developed. But Lord Russell said this as long as fifty years ago:

"Not only will men of science have to grapple with the sciences that deal with man, but—and this is a far more difficult matter—they will have to persuade the world to listen to what they have discovered. If they cannot succeed in this difficult enterprise man will destroy himself by his halfway cleverness."

[The world has not listened to Bertrand Russell: I don't expect it will listen to me. It is not necessary that man will survive. It is not likely that he will. But when he passes, I hope with Loren Eiseley that there will be left a cardinal singing in a dogwood tree in flower. Then the world may become whole and sane again.]

Though the vast majority of species in the history of life have run the course and passed on, if we regard life as sacred, we must adopt ethical precepts that reflect that essentially religious attitude and act to preserve the life of not only our own species, but that of our fellow creatures on this good planet.

I will say, then, in a somewhat long summary, that scientific truth has been tested by the only trial that matters: it works. Logical "truth" is not truth, but the validity of deductive reasoning: the logicians have shown this to their satisfaction. Poetic "truth" is not truth, it is appropriate, according to the circumstances, expressions of man's emotive response to beauty, joy and sorrow, life and death, and the other of the unknown whereof we cannot speak. Ethical truth is empirical, scientific, and based upon only one unconfirmable assumption comparable to the likewise unconfirmable principle of uniformitarianism which says that the laws of science hold in time and space. For naturalistic ethics, that unconfirmable assumption, though a matter of faith, is the postulate that life is good.

If man survives, he must, through psychosocial evolution, develop an ethic that enables him to live in harmony and balance with his environment—the good planet Earth. Natural selection, even in psychosocial evolution, is differential reproduction and in all human societies the widely deviant is less likely to leave any biological or intellectual offspring or persuade others of his dysgenic views. Man's system of ethics is as variable as his biological attributes and in the latter respect man is the most variable species known. Evolutionarily, this is good, making possible change in a changing environment. But we should be concerned with finding the ethical statements, that when followed, will insure the