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the fundament is unsatisfactory today, and will continue to be so because of the inherent infertility of the lands.

The future of the area appears to lie in the field of forestry. The government has recognized this fact and is actively engaged in developing the rich scenic and historical interests by establishing the Cumberland National Forest. Apparently, all of the interfluvial areas should be rededicated to forestry, leaving small isolated agricultural settlements in the valleys of the Plateau.

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INDIVIDUALISM AND COLLECTIVISM IN NATURE

WM. CARPENTER MACCARTY, SR., M.D. D.Sc.

Mayo Foundation

I have chosen my subject for two reasons. The words individualism and collectivism are used very commonly by sociologists, socialists, news-commentators, political leaders, and general conversationalists. I have spent my life studying these phenomena in nature, especially in the evolution and behavior of many higher forms of life. In my opinion biologists who have thoughtfully observed these natural phenomena should be greater authorities, and have a better point of view, than most sociologists. I am not a sociologist; I am not a politician or a political economist. I certainly have no political ambitions but I do have a great sympathy for leaders of all groups, who are trying sincerely to solve man's sociological and economic problems.

My subject forms merely a skeleton around which I hope to build a constructive criticism, using the word criticism in the sense of Victor Hugo, who said it is "to stimulate, to press, to chide, to awaken, to suggest and, to inspire." I particularly wish to awaken a sense of justice, to suggest more careful thought before speaking and writing, and to inspire decency and accuracy in American journalism, politics, and general thought.

We are living in an age of very dangerous and wasteful misunderstanding. The resultant confusion, emotional irritability, and tragedy are due, probably, to a universal prevalence of ignorance, ungentlemanliness, and the very common unsportsman-like behavior of leaders and followers. We are suffering from unscientific philosophical immaturity, prematurity of loud expression, and the inadequacy and indefiniteness of words.

I wish to call your attention to three quotations which have been picked at random from two leading and popularly read publications. These quotations are quite characteristic of usual thought in popular writings, lectures, conversations, and discussions. They represent the kinds of thoughts and expressions which create popular opinion and, control our destinies in democratic countries.

In the first quotation we find a discussion of education. The writer says:

"Has any economist attempted to compute the revenue diverted from general business by the cost of higher education? Yet how many families there are who are forced to curtail their living expenses to the utmost in order to provide son or daughter with a college education. Figure the cost at \$500 to \$1,000 a year for a student and it does not require much education to realize what a tremendous effect this has on industry as a whole and will continue to have as long as we offer ourselves as willing victims to the juggernaut which higher education seems to have become. It is just another vicious circle, since it results in the college graduate finding himself or herself without a position because industry cannot provide one, due to this diversion of revenue."

In the same column of wisdom we find a viciously suggestive opinion of the great German people. The writer says:

"The other day the newspapers reported that medical students in the Greater Reich will use only Aryan cadavers for dissection. One wonders whether any academic pronouncements will be made with regard to vivisection. To sum up the prevailing system as to these two courses in Germany, it would seem that Catholics, Protestants and Jews may be used for vivisection and certified Aryan cadavers for the purpose of dissection. Thus anatomical research will keep abreast with Nazi ideology."

The third quotation is taken from a Pro and Con discussion of the question; "Should we curtail those who would destroy us?" Mr. Pro says:

"The Nazi Swastika is the brutal, intolerant negation of civilization. It means international thuggery, torture, and death for all who oppose its tenets; persecution for Jews, radicals, ministers of religion, gags for anybody who dares speak or write against authority."

In spite of Mr. Pro's apparent dislike of the Nazis and their behavior toward disturbing minorities he condemns "Nazi camps," "Communist meetings," "the Ku Klux Klan," and "Homer Martin, leader of the C.I.O. in the United States." These, says Mr. Pro, are "all bound to destroy civil liberties." True or false, how could these be curtailed by anything other than some form of Naziism, fascism, or education? Quite naturally we choose the educational form of curtailment in the United States of America, but such emotional criticism as Mr. Pro uses against his enemies cannot breed anything but strife. I wonder if Mr. Pro knows just why Stalin, Mussolini, and Hitler established their dictatorships in their respective countries. Such expressions as I have quoted are very unfair, unsportsmanlike, unscientific, misleading and harmful at a time when sanity and unemotionalism are most needed to save our civilization from the usual destruction of civilizations.

The popular use of such words or expressions as: Individualism,

collectivism, communism, socialism, totalitarianism, democracy, aristocracy, labor, capitalism, Naziism, Fascism, Hitlerism, dictatorship, ideology, good neighbors, economic royalists, the common man, the forgotten man, the selfish few, equal distribution of wealth, social security, collective security, equal opportunity, leftists, rightists, popular front, patriotism, and many other equally emotional and undefinable appellations, is absurd to any honest scientific mind. When I hear such words and expressions I am reminded of a thought in Stephen Vincent Benet's story—"You Don't Really Live Till You're Here." He speaks of a girl who is singing Irish ballads and says, "You know, she's really a Brazilian. And the wonderful thing is, she learned the Irish ballads from a phonograph record. She can't speak a word of English otherwise." I wonder often if those who use such words and expressions so glibly, have not also learned them phonographically. I wonder if they know what they are talking about, and especially if they appreciate what harm they are doing to a sane solution of man's problems.

I am certain that man's problems are biological and some biologists should take time to set some of our sociologists on a scientific line of thought. I have yet to hear of an influential sociologist, statesman, news-commentator, politician, government leader (with the exception of Henry Wallace, and perhaps a few others) who really knows anything about the fundamentals of the structure, behavior and organization of living matter, of which man is only a very small part. Leaders of government have never come out of the fields of science. Such would not be expected, because science lacks that emotional and sensational quality necessary to sway the masses, and thereby win popular favor and position of political leaderships. Science is not aggressive by nature, it sees the world through eyes that appreciate the real place of mankind in the whole realm of life; it sees the struggle of man side by side with that of thousands of other, and more numerous, forms of life.

I never read or hear the usual comments on human struggles but what I am reminded of a classification of scientists, which I made many years ago. The classification applies equally well to all other fields of human intellectual activity. It merely suggests that there are stages of preparatory training from which our leaders of men start their active careers. As leaders, regardless of the stages of training and experience, they control the thoughts and behavior of the masses of people. Today, especially in a democracy, an unskilled and untrained individual can become a leader if he has unusual natural intelligence and a good flow of emotional language. He can control the masses and get the votes. A prize-fighter's opinion is just as readily accepted as that of the most highly trained president of a university.

First in my classification of scientists is the high school sci-

entist. He is a student who has just begun the study of physics and chemistry. He becomes materialistic with all its narrowness and incompleteness. He is very dangerous as a sociologist. Then there is the college scientist. He is also a student; one who has just entered the fields of general biology, and has become acquainted superficially with "The Descent of Man," "The Struggle for Existence," "The Survival of the Fittest," and learned some of the evidence for the theory of evolution. He becomes an infidel, or skeptic, and is indifferent to, and disdainful of, all systematized religions. He, too, is very dangerous as a sociologist. Then there is the University Scientist—a student who begins the actual observational investigation of, and experimentation with, natural things and phenomena. He becomes an agnostic, he knows nothing, he has no preconceived ideas, but he hopes to make some great discovery of things, facts, or principles. Such an individual usually works mentally and spiritually alone, he is deeply absorbed in his problems, he neglects the things and movements of ordinary daily life. He is dangerous by omission rather than commission, for he might well contribute something to sociological thought. Then there is the boarding-house scientist—usually a clerk, book-keeper, traveling salesman, or a struggling journalist. He lives in a boarding-house where eat a variety of genteel people—old maids, stenographers, school-teachers, a preacher and perhaps others of middle-class American respectability. The young man is of very moderate education; he reads "Popular Science," "The Scientific American," "Popular Mechanics," "The American Mercury," perhaps "The New Republic," "The Nation" and the science news in popular magazines and newspapers. By comparison he is quite learned. He has not had enough experience to be a skeptic or an agnostic. He is constantly in hot water with the fundamentalists and the preachers. He is very apt to have ready solutions for all problems. He is the perfect ideologist and is often very dangerous as a sociologist. And last, there is the real scientist—somewhat older than the others. He is one who very likely has contributed something new to knowledge. He is a quiet but keen observer, and has very little positive to say. He recognizes the universality of ignorance, and the prevalence of sham and superficiality. He sees far beyond his own mentality and that of others; he appreciates the insignificance of mankind on this earth, and in the limitless universe; he feels the futility of presenting real truth to the average mind; he hopes for a life and an age of less political and sociological asininity. This type probably has no ideologies. If he has they are in his dreams. He feels, unfortunately, a certain futility of saying anything about sociology.

This grouping or typing of scientists, as I have said, applies also to sociologists, news-commentators, lawyers, politicians, labor leaders, industrialists, professors and even doctors. Most of our leaders have gotten no farther than the high school, boarding-

house or college stages. It is not the real scientist or real sociologist who creates misunderstanding, emotional irritability, and confusion.

After this long introduction, let us look at three of the words very commonly used by writers and speakers: Individualism, collectivism and ideology. Let us see what the dictionaries have to say: Individualism means: "The quality of being distinct or individual; being independent in action; acting according to one's own will or for one's own ends; individual as opposed to associate action or common interest." "It is a theory of government which favors the non-interference of the state in the affairs of individuals; it is opposed to socialism or collectivism."

Collectivism means: that "Socialistic theory or principle of centralization of all directive, social, and industrial power, especially of control of the means of production, in the people collectively or the state." "As used in correct speech and also in economics no very definite line of distinction between communism and socialism can be drawn." "Generally speaking, communism is a term for a system of common property and this should be accepted as the reasonable correct usage of the word; but even by socialists it is frequently used as practically synonymous with socialism." "Collectivism is a word which has recently come into vogue to express the economic basis of socialism." "Collectivism, which is now used by German as well as French writers, denotes the condition of a community where its affairs, especially its industry, are managed in the collective way, instead of the method of separate individual effort."

You have noticed, probably, that these definitions violate the first principle of definition: they use the word to be defined as an explanatory word in the definition defining it. Like many definitions in dictionaries, these are somewhat obscure, incomplete and unscientific. At least, they do not deal with individualism and collectivism as great natural and universal phenomena; they confine their definitions to a very narrow field in human behavior.

The word ideology, which is so frequently used, means: "The science of ideas or of mind." "It is a name applied by the later disciples of the French philosopher, Condillac, to the history and evolution of ideas, considered as so many successive forms or modes of certain original or transformed sensations." "It is a system of mental philosophy which derives knowledge exclusively from sensations."

Can you imagine the average workman, clerk, bookkeeper, politician, physician, or any other intelligent or unintelligent human being understanding what these statements really mean?

Condillac was a Frenchman born of a legal family in 1715. He was a political writer and died in 1780—a long time before anyone knew anything about the fundamental structure, behavior, and organization of living matter. It was also a long time before

anyone knew anything about individualism and collectivism as fundamental phenomena in the whole realm of living behavior. He was a psychologist, but not one of the modern psychologists who practices experimental physiology, pathology, and physics, and also knows the structure of the brain and the various things and organs which influence it. It was this man who has given the sociologists, commentators and modern sociological thinkers the word "ideology," which has been so frequently applied to the imagined ideas and thoughts of men like Stalin, Mussolini, Hitler, Roosevelt and other leaders of our day. It is so very easy to get lost in a maze of word-novelties and sensational emotionalism.

Most of you are scientists and know that our present knowledge of life, its structure, and behavior is very recent. It took from 1590 to 1673 to develop the earliest forms of a fairly low power microscope. Most of the improvements occurred after 1830, fifty years after Condillac died. Only in the last half of the nineteenth century did we begin to appreciate the important details of cells, as the units of life, and their part in the structure and behaviour of all larger forms of life. In 1831 Brown vaguely described the nucleus and in 1836 Valentine described the nucleolus. It was not until 1839 that the cell theory of life was put forth. It was not until long after these dates that scientists began to appreciate that cells live both individualistically and collectivistically. We microscopists spoke of unicellular and multicellular forms of life. We did not think of individualism and collectivism; and certainly did not think of them as wide-spread vital phenomena of human sociological and political economic significance. We were neither sociologists nor political economists. We were not politicians. Our ideologies, if we had any, had not been narrowed down to fit any kind of political economy. This neglect on our part was rather unfortunate; we might have given our practical philosophers a better and more accurate concept of life and social order.

To the scientist, the word individualism is a name given to that phenomenon which is characterized by the living of a unit of life independently of other living units. The living units may be single cells or beings composed of many cells. Collectivism is the name for the phenomenon which is characterized by the living of a unit dependently upon some other unit or units. This is a form of parasitism with mutual benefits.

You and I know that man and all other forms of life are composed of cells, and that what they do as larger units is merely a magnification of what cells can do. We know that all cells eat, breathe, expel their wastes, have motion, are sensitive to their environment, store up and transform energy, work, rest, reproduce their kind, and intend to live as long, and as well as possible. They also tend, if possible, to see that their progeny lives just as long, or longer. This is a God-given ideology; it is the primary phil-

osophy of life and no man-made philosophy or ideology is very apt to interfere with it. It is thoroughly individualistic.

In nature there are four types of individualism:

1. Absolute Individualism.—A condition in which the units can and do live regardless of all other forms, with the exception of their immediate ancestors. I am not so sure that such a thing really exists. The nearest approach to it is cancer among cells and anarchy among men. Both always destroy themselves.

2. Genetic Individualism.—This is seen in the make-up of different species, genera, etc. Here the types live somewhat in groups, but the individuals remain independent and distinct. There is no organic or structural collectivism.

3. Cooperative Individualism.—In this type the individuals remain independent units but live as families, clans, tribes and sometimes as nations or races, or even unrelated groups. Again there is no organic or structural collectivism. They cooperate for mutual protection. This is the basic theme of all religious, ethical and economic brotherhoods of man. This is not collectivism; it is merely a cooperation of independent individuals. This is the basis of the English and American social order. Both are individualistic and cooperative. They are in no sense collectivistic either in principle or in practice. The individual may go and come as it pleases just as long as the going and coming do not prevent other individuals from sustaining themselves. Cooperative individualism is merely an extension of genetic individualism to larger groups, not necessarily related by race, work, religion, or political party. It is the most durable form of life because it is not parasitic.

4. Symbiotic Individualism.—It is characterized by structural or organic parasitic dependence. The units are still individuals but as such have become, structurally and organically, so bound together and so highly specialized, that they have lost their ability and opportunity to be self-sustaining. This is the picture found in all multicellular organisms especially those of the higher orders. It is the most vulnerable form of life and always succumbs to other forms which are individualistic.

Perhaps the last statement may be a surprise to those idealists who have thought man the highest form of life. Human mortality statistics and the causes of death should teach the idealists just how vulnerable man is and what insignificant beings cause his destruction.

Speaking only as a biological scientist and not as a professional sociologist, I cannot refrain from stating that all collectivistic forms of life will succumb to individualistic life. Very probably the first life on the earth was unicellular and individualistic, and also, very probably, the last life will be unicellular and individualistic. Certainly the largest forms of cellular collectivistic (symbiotic individualistic) life have succumbed. Nothing is more tragic than the fossil remains of dinosaurs and the passing of the sequoias. Equally tragic are the remains of what were once thriving and even glori-

ous civilizations. Nothing is more distressing than the rapidity with which large and prosperous cities, made by highly specialized parasitic human beings, become destroyed and depopulated by a few individuals such as bombing pilots and artillerymen. Nothing is quite as belittling as what happens when a small group of individuals pulls the switches, closes the water and gas valves, or blockades the food supplies of a city. Nothing is more exasperating and destructive than to keep a man from earning a living simply because he does not belong to a union. Nothing is more ridiculous than preventing a graduate physician from practicing medicine simply because he hasn't passed an examination controlled by medical politicians. Nothing is more absurd than to have specialized doctors for almost every organ in the body.

Compulsory specialization and collectivism go hand in hand. Both create parasitism, dependency and vulnerability. Life is primarily individualistic and as such it has survived. Even the greatest of collectivistic beings have to revert to unicellular individualism every time they reproduce their kind.

May I suggest that we, in America, should develop an "ideology" based upon cooperative individualism—a form and manner of life in which each individual is a perfected self-sustaining, physical, moral, and intellectual unit which can cooperate with all other perfect units for mutual protection? This in my opinion was the ideal embraced in our constitution, one of the most scientific, humanitarian, sociological documents man has produced. Such a concept would not impede economic progress; there might still be great railroads, industries, and crop-producing farms. These have suffered often because of lack of cooperation, and parasitic overspecialization which has robbed their units of their self-sustaining God-given individualism.

At present we are suffering from organization and specialization rather than unification. In America we have beautiful examples of cooperative individualism in some of our sports, which would serve our sociologists well if they took time to study them. Let us look at a first-class football team. From coach to the least important players and cheer-leaders all are individuals— independent, self-sustaining units. The players must be physically, mentally and morally fit. They play their parts cooperatively. They work as a great whole. They play according to a plan. But when the plan is interfered with they play individually. It is the individualist—the lone player who, under stress or adverse circumstances, gets the cheers from his teammates, the coach and the crowd. He breaks loose and shows himself a great sustaining individualist. The collectivistic group often fails. The day is saved by someone who takes the "breaks" by using his individual, physical and mental fitness.

All human progress has been made by ready individuals, seeing and taking the breaks of life. All great inventors, discoverers, creators, thinkers, musicians, mariners, explorers, industrialists,

theologians, philosophers, statesmen, teachers, writers, scientists, doctors, and other leaders of men have been individualists. Many of them have resulted as a reaction to the failure of collectivism. They are the players who as natural individualists save the day.

Thus I have attempted to give you, briefly and suggestively, what I think, as a scientist, of individualism and collectivism in nature, hoping that these, and other facts may be of value to our leaders who, I am certain, are sincerely—although sometimes ignorantly—trying to solve our great human problems.

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THE SEARCH FOR NATURAL HISTORY AREAS IN MINNESOTA

*Report of the Committee on the Preservation of
Natural Conditions*

BY

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At its annual meeting in 1937 the Minnesota Academy of Science went on record as favoring definite action toward the preservation of suitable natural areas in a virgin or unmodified condition and the encouragement of coordinated scientific studies thereon, as a result of which the president appointed a Committee on the Preservation of Natural Conditions. During the first year the committee has endeavored to prepare a broad ground work which would make possible a recognition of the needs and desires of the Academy, an understanding of the principles to be followed, and would permit an intelligent approach through the best possible information to the specific problems involved.

In the first place, the committee has confined its attention to the preservation of natural areas for scientific purposes as contrasted with recreational uses, aesthetic purposes, or broader conservational purposes. The possibilities of long-time, coordinated, biological observations leading to ecological studies of the indigenous fauna and flora, particularly with respect to the important forest and prairie biotas in Minnesota, have led to special consideration being given to areas which are suitable for such studies. These areas should be relatively large in order to provide a sufficient variety of species and of environmental conditions, to assure the maintenance of adequate colonies and populations, to permit biological adjustment to changing environmental conditions and to prevent undesirable invasions. It has also seemed desirable to consider areas which for such reasons as the posses-