

theoretical considerations, it is the "failure" of the Marxian movement itself that convinces its critics of the unscientific character of Marxian thought.

Max Eastman, for instance, who, though not a confessed Marxist, has regarded Marx as "one of the giants of science,"¹⁾ and has considered his work of tremendous importance if only it were freed of its unnecessary Hegelian metaphysics, is now convinced that Marx cannot be called a scientist at all, since he produced his class struggle theory and his main work *Capital* for the sole purpose of demonstrating his metaphysical dialectical theory. In Eastman's present opinion, this theory is not merely superfluous decoration, but the underlying reason for the Marxian debacle.²⁾ Edmund Wilson explains that "from the moment that Marx and Engels had admitted the Dialectic into their semi-materialist system, they had admitted an element of mysticism."³⁾ Even the limited critique of more timid re-evaluators, Lewis Corey,⁴⁾ for example, holds that "the Hegelian hangovers in Marx," are partly responsible for the Marxian failure. Sidney Hook, too, climaxing his anti-Marxian development that began with *Towards the Understanding of Karl Marx*,⁵⁾ no longer merely opposes the "universality" of dialectical materialism but is now convinced that the term dialectic "is so infested with ambiguity, that it is not likely to function as a serviceable procedure in any inquiry which aims at the achievement of reliable knowledge about ourselves and the world we live in."⁶⁾

According to the dialectical theory, say the critics, the opposition between capital and labor must grow and lead to a socialist revolution. The revolution must lead, of necessity, to a higher stage of social development, just as the bourgeois revolution has led from the "lower" social and cultural level represented by feudalism to the "higher" one of capitalism. Instead, the development has led to the practical abolition of the class struggle and to the fascist society. The dialectical law of development is supposed to manifest itself not only in the sphere of political struggles but throughout nature, in thought, and in all realms of social life. Belief in this law, the critics maintain, accounts not only for the wrong Marxian notion of the "inevitability of progress"; it also explains the Marxian disregard for inductive research methods and for a practical approach to the real social problems. It supposedly also explains the Marxists' a-moralistic attitude. They are said to believe that regardless of their behavior, whether it is right or wrong, good or bad, they must be victorious in the end, because "history is on their side."

1) See Eastman's Introduction to the Modern Library edition of *Capital*. New York, 1932.

2) See Eastman's *Stalin's Russia and the Crisis in Socialism*, and *Marxism: Is it Science*. New York 1940.

3) *To the Finland Station*. New York 1940, p. 189.

4) *Marxism Reconsidered*, the "Nation"; February 17, 24 and March 2, 1940.

5) John Day Company. New York 1933.

6) *Reason, Social Myths, and Democracy*. New York 1940. p. 266.

Before dealing with specific arguments of latter-day critics it must be said in advance that unfortunately everything brought forth today merely repeats the criticism of Marxism of yesterday. The new "anti-Marxists" have not even learned to avoid their predecessors' mistakes. Nor do they show any ability to understand the actual historical development which they offer as proof for the wrongness of the Marxian point of view. Rather, just as "official Marxism" itself degenerated to the point of being outright silly, so its critics, too, descended to the same low level, if not a lower one. There is for instance, Sidney Hook's essay "Dialectic and Nature"⁷⁾ which manages to say in 43 pages just about what Benedetto Croce, in 1906, was able to put on a single page,⁸⁾ namely, that it is merely amusing to look upon dialectical materialism — as Friedrich Engels did — "as the science of the development of human society and thought," and then to illustrate its validity with examples taken from natural processes such as the growth and decay of plants. Edmund Wilson, to give another example, brings forth the "deep-searching" but very old remark that the "Hegelian triad: the *These*, the *Antithese*, and the *Synthese*, taken over by Marx, was the mythical and magical triangle which from the time of Pythagoras and before had stood as a symbol for certainty and power and which probably derived its significance from its correspondence to the male sexual organs."⁹⁾ Such statements have about the same importance as the utterances of opposition "dialectical materialists" like J. B. S. Haldane, who claimed a great improvement in his digestive system after being converted to Marxism.

Whereas dialectical materialism "is easily one of the most important social doctrines of our times" for Sidney Hook, who conveniently measures "the importance of a philosophy by the number of people who hold to it,"¹⁰⁾ for Max Eastman there is pleasure in the fact that "in England and America Marxism never found a home." The reason for this, he thinks, is "that Marx was educated in the atmosphere of German metaphysics." The Germans, he continues, "notwithstanding their great achievement in the laboratory, have remained by comparison with us (the Anglo-Saxons) primitively credulous and animistic."¹¹⁾ These Germans, Wilson agrees, "who have done so little in the field of social observation, . . . have retained and developed to an amazing degree the genius for creating myths."¹²⁾ This German propensity, plus an "Old Testament sternness" brought Marx, in Wilson's opinion, "closer than he could ever have imagined to that imperialistic Germany he detested." Because Marx harnessed "the primitive German Will," disguised as the Dialectic, i. e. the "semi-divine principle of history," to his movement, he finally only helped prepare the way for fascism.

7) *Reason, Social Myths, and Democracy*, p. 183 to p. 226.

8) *Lebendiges und Totes in Hegels Philosophie*, p. 167.

9) *To the Finland Station*, p. 190.

10) *Reason, Social Myths, and Democracy*, p. 183.

11) *Marxism: Is it Science*, p. 174.

12) *To the Finland Station*, p. 189.

"After all," Wilson says, "the German Nazis, too — also the agents of an historical mission — believe that humanity will be happy and united when it is all Aryan and all submissive to Hitler."¹³⁾

In this manner anti-Marxism takes its place in the present war effort. It is fitted into the struggle against Nazism. To oppose Marxism at home is to fight the imperialistic competitor abroad. But here, too, the Nazis acted first and with much greater ruthlessness. They declared Marxism a part of the "Jewish-Bolshevistic-Plutocratic-Anglo-Saxon" conspiracy to destroy the Germans and rule the world. The present-day American "anti-Marxists" merely turn the nonsense around by declaring Marxism to be part and parcel of the imagined "historical mission" of the Germans to rule the world. In both cases, consciously and unconsciously, there is an attempt to establish an "internal unity" that conforms to the external imperialistic needs. It is thus no accident that anti-Marxism gained new impetus in the United States with the coming of the war. It is an additional way of declaring one's solidarity with the imperialists of the nation.

Aside from this, the identification of Marxism — via Hegelian idealism — with German mysticism, is not only nonsensical but is an argument as old as Marxism itself. The Hegelian philosophy was an expression of the whole cycle of the bourgeois revolution that began by attacking one form of class rule and exploitation, only to wind up by establishing another. However, although Hegel's philosophy reflected the whole of the bourgeois revolution, and thus also the period of *Restoration*, it emphasized the latter. This fact, the politically "reactionary" side of Hegel, which paralleled in Germany a relative backwardness of scientific development and an industry that was only in its infancy, has always been related to the "mystical principles that rule German philosophy." Even the young Marx thought it was characteristic of the Germans that their "practical life is unintellectual as their intellectual life is unpractical."¹⁴⁾ But he soon ceased explaining this situation in terms of the "German character," and went on to explain it in terms of historical and economic differences between the various nations.

The difficulties and frictions accompanying the transformation from feudal to bourgeois society produced positive and negative, static and dynamic philosophers, and also the Hegelian variety that contained both dynamism and resignation and was both negative and positive. The contradictions of the capitalist system provided its philosophers with either revolutionary or reactionary attitudes. In Hegel both elements are found together. His ideas can be interpreted in manyfold ways. But such interpretations shed light not so much upon his philosophy as upon the ideas and needs of his interpreters. To find, as is done today, a kinship between Hegel and the Nazis, or to deny such a kinship, to accept or reject Hegelian dialectics

13) *Ibid.*, p. 197.

14) *A Criticism of the Hegelian Philosophy of Right*. Selected Essays, New York 1926, p. 36.

in the name of science — all such attempts do not much more than explain prevailing political and economic rivalries that find expression in philosophical thought.

Hegel's idealization of the real historical processes that form the basis of his philosophical system comprises more than just the German reality. His philosophy must be explained not only by the German situation, but by this situation *within* the whole setting of the expanding world system of capitalism. After all, he had been profoundly moved by the French Revolution. He knew the political economy of his time, that is, the *laissez-faire* ideology of France and England. He had beheld the great social upheavals of the Napoleonic wars. The range of his knowledge — despite the nonsense incorporated in it — remains an amazing intellectual feat. It would simply be preposterous to explain his philosophy by his German surroundings alone. It was the capitalist mode of production itself, quite independent of its concrete manifestations in any one nation, that determined Hegel's idealism.

It makes one suspicious, however, that so much attention is paid to a doctrine that is regarded not only as utterly false, but as of no value to the practical aspiration of its supporters. It makes one suspicious, too, that all the arguments directed against the dialectic deal only with its formal aspects, which should attract the smallest interest. Yet, examples of manifestations of "changes from quantity into quality," of "dialectical opposites and their syntheses," presented by Marxists are refuted over and over again. "Triumphs" are gained by tireless quoting from Bolshevik sources¹⁵⁾ ridiculous attempts to apply the "dialectical method" to all branches of science to art and literature, and to pastimes of all sorts. The reason for this kind of simplification is to be found in the fact that the critics do not attack the Marxian dialectic at all, but a dialectical strawman of their own making. They argue only against their own insufficient conceptions of what constitutes the dialectical theory, or against "Marxists" who do not understand or do not care to understand its meaning. In order then to refute the recent critics of Marxism, it is first of all necessary to re-state the dialectical theory and, second, to trace its historical development up to the present. The fact that most of its critics argue beside the point will then become almost self-evident. There remains the question of why these critics insist on dealing with a distorted Marxism rather than with its real content.

I

DEVELOPMENT OF BOURGEOIS SCIENCE AND PHILOSOPHY

Professor Whitehead has noted that "the history of philosophy runs curiously parallel to that of science."¹⁶⁾ But there is nothing curious about

15) See J. Rosenthal's articles *What is Dialectical Materialism?* in the "Modern Quarterly". May-June 1935. Also the chapter "Science and the new Obscurantism" in S. Hook's *Reason, Social Myths, and Democracy*.

16) *Science and the Modern World*. Pelican Books, 1938, p. 167.

this fact. Hegel's philosophy, from which the Marxian dialectic issued, also corresponds to a certain level of scientific progress and to a definite stage of social and economic development. Hegel himself maintained that "every philosophy belongs to its own time and is restricted by its own limitations." Nor must the "parallelism" noted by Whitehead be taken too literally. For a long time philosophy and science were one, "paralleling" with their own development that of society. Their serious separation coincides with the rise of the capitalist mode of production. In Hegel, philosophy seemed at odds with science; the "parallelism" of both came to light by way of their disagreements. The feud between science and philosophy has not yet come to an end. The justification for philosophy itself is often questioned as it is now, for instance, by Max Eastman. Yet it is still difficult to draw a line between science and philosophy, a fact made manifest by the various existing "philosophies of science" and, perhaps, also by Eastman himself, when he complains that there is "unfortunately no word in our language to distinguish philosophy (in the pious and soul-upholding meaning of the term) from the effort of sublimely curious minds to develop the most general implications of science, to reconcile its conflicts, investigate it with its own method, and criticize it from the standpoint of its own cool search for fact."¹⁷ Meanwhile, until such a word is found, Eastman, too, has to speak of "philosophy." But he "escapes" the dilemma by putting it in quotation marks.

However, instead of trying to solve the problem by a definition of terms, we will investigate how the problem itself arose. This is not difficult, because the continuity of the social process as manifested in the development of the means and modes of production is revealed also in the history of science and philosophy. In the Middle Ages science and philosophy were closely bound up with theology. The Renaissance disconnected science — the natural sciences — from its religious frame. There was of course a continuous development of science despite its previous connection with religion, because of the general social development. Change took place even during the Dark Ages; otherwise they would be still with us.

Modern science, however, begins with the Renaissance. Its development is that of capitalism, and vice versa. Feudalism gave way to the modern nation state, and serfdom to wage labor. With the decline of medieval society the power of the Church declined. The discovery of gunpowder and printing "democratized" Europe; militarily, and intellectually, the feudal lords and the Church could be attacked. Trade and commerce found social recognition; riches were accumulated; banking developed. The towns grew, and with them a large middle class. Craft-guilds flowered under the protection of kings. The New World was discovered; the old world became new. All this development influenced thought.

It is of course impossible to place successive periods of history side by side as just so many separate entities. There is much overlapping. Scien-

17) *Marxism: Is it Science*, p. 164.

tific methods were used hundreds of years before the Renaissance; many scientific achievements of later periods had been conceived in the forgotten past. But with the Renaissance, a way of thinking that had been the exception became the rule; isolated scientific results were brought together into a system of knowledge; a new way of production — a new way of life needed continuous scientific development just as much as they inspired that development.

The Renaissance was a transitional rather than an independent stage between feudalism and capitalism. It was a bridge that led from agricultural to industrial production, from hand to machine labor. It was an age of mechanical inventions as much as it was one of crafts, arts, and literature. Its *new, its mechanistic side* was what determined the character of its philosophy.

To be sure, there was no straight road that led from the Renaissance to modern capitalism. Progress and reaction alternated; the scenes of capital development shifted from the Mediterranean to the Atlantic; there was a difference between where capitalism began and where it could really flourish. And it was not until the *Industrial Revolution* that capitalism as a world system really came into its own. The guilds, for example, at first gained in importance because of the development initiated by the Renaissance, and by so doing retarded capitalist progress. They disappeared first in England, the most advanced capitalist country, but lingered on until the nineteenth century in other, less developed nations. Manufacturing and the transformation of agricultural workers into factory hands was not at first based on machine production; but it derived its organization, its methods, its incentive, its rationality, from mechanistic principles that had their source in machine mechanics.

The parting of science and religion furthered the separation of science from its immediate connection with the productive processes. Backward agricultural societies in which technology and industry are only supplementary factors of secondary importance do not call forth the "independent" development of science. There the "applied sciences" are undistinguishable from the productive process; the "theoretical sciences" from religion. With the development of technology and industry, theoretical science finds greater application in material production, but, through the accompanying division of labor, it becomes increasingly separated from the direct labor process. As an "independent" force it escapes the narrower limits of slower-changing productive habits that are determined by class relations as well as by technical improvements. Its own rapid development, however, hastens the development in the productive sphere. But this development does not proceed so consistently in the latter. Hence the often regretted gap between potentialities and reality, between scientific and social achievements.

In the Renaissance, however, science was not as yet truly capitalistic, not as yet subordinated to the specific capitalistic division of labor. Side-

stepping religious issues and traditional philosophies, science became experimental and returned for observation to the fields of practical activity. The thinkers of the Renaissance were quite aware of the real driving forces behind thought processes, and many of them were actually skilled in both manual and intellectual labor. Leonardo da Vinci, for example, could not conceive a science that was not practical. But those "who love the practice without the theory," he also said, "are like the captain of a ship without a compass; they do not know where they are going."

The technical revolution united rational training and manual work which, in turn, gave further impetus to the development of the machine. Da Vinci was only one of the countless inventors, scientists, philosophers, artists, and craftsmen who were profoundly influenced by the new productive force. Galileo shared their view of the close relationship between theory and practice; and it is this attitude that made him consistently use the experimental methods that ever since have guided scientific research.

It was also this close relationship that led to generalizations based on mechanical principles derived from experimental science and the numerous mechanical instruments already in use. The applicability of the mechanical principles to the world at large was indeed astonishing and it is not surprising that men, impressed by the discoveries in the mechanical science, should extend these principles into a mechanistic view of the world and universe. The mechanistic view dominated the mind wherever machine-processes made their appearance, in Italy as well as in all other advanced sections of Europe.

All science depends on manual work. The early geometry, astronomy, and mathematics corresponded to the economic needs and capacities of agricultural class communities. The problems of science change with socio-economic changes. Other questions and new questions are raised and answered. The structure of modern science cannot be divorced from the modern form of production. The relatively static character of pre-capitalist modes of production caused men to inquire into the nature of things; the more dynamic capitalist mode of production caused men to prefer inquiries into how things behave. The new scientists were concerned less with the primary or ultimate nature of one or another phenomenon than with relations between them. Not substance but sequence interested them first of all. To alter the stuff of nature, not merely to classify it, was a new scientific outlook initiated by actual socio-economic developments. Science was extended from its earlier application to limited social needs, to new needs arising out of machine production and all that goes with it. Experiment displaced mere speculation, and assumptions of the past, when tested, either were shelved or took on new meaning. Nevertheless, the methods of inquiry that were least concerned with the "true" and "final" nature of things disclosed more about their nature by following their relational behavior than by regarding them as static entities. The skepticism of the experimenter led to greater certainty than the "certainty" of those who refused to, or could not, engage in experiments.

Machines were constructed to obtain greater control over nature, to increase the exploitation of men and, with it, the wealth of the ruling classes. "The first forces to be utilized were the passive forces of weight and pressure exerted in the natural motions of air and water — the wind that fills the ship's sails, the stream that drives the water-wheel . . . The pioneers of science in the sixteenth and seventeenth centuries, notably Galileo and Newton, were specially interested in the laws of motion and gravity, which they were the first to formulate. Later came the much more powerful active energy released by combustion. After taming the earth and air and water, man harnessed fire to his engines of production. But one cannot effectively enlist these natural forces until one knows a good deal of their working apart from human control. So a science ultimately bent on the fruits of power and wealth will find it useful to regard nature itself as a machine of unsuspected complexity.¹⁸⁾

That there were mechanisms working in nature could not be doubted; the mechanical laws of motion and gravity were verifiable. It was odd, however, that the "laws of nature" and the mechanical processes in production were so much alike. Why should a certain way of thinking arising out of production fit nature to the extent that it actually did? It was much more plausible to think that man had finally discovered the "laws of nature" and could now adapt himself to these laws. The better these "laws" were understood, the easier it would be to control nature and to better the life of man. Mechanistic principles thus led to positivistic philosophies.

Did science read these "laws" into nature, or did it discover them in the study of nature? Here we must recall that the development of the machine had been preceded by inventions and by the improvement of simpler tools. But whatever tools had been used, they had been adapted to man's need of wresting a living from nature. The direction of the development of tools and laboring processes was determined largely by man's situation within the whole of nature. The tools he used, the measures he took, the thoughts he had were adapted to natural facts. He either employed or fought natural forces. "Laws of nature" had thus always been taken into consideration wherever man was an active partner in the human-nature relationship, i. e., where he became a producing and therefore a social being.

Ruled by the forces of nature, and bent on controlling them, man always found a connection between the "laws of nature" and the tools he used to cope with the "laws." The more men improved their means of production, the better they could deal with nature, and the more facts they could discover about it. "Laws of nature" were recognized to the same degree that the means of production were improved and production itself extended. In other words, the "laws of nature" were produced through social production within nature. These "laws" were just as much a product

18) F. M. Cornford, *Greek Natural Philosophy and Modern Science*, in "Background to Modern Science." New York, 1938, p. 19.

of society as society was a product of nature. For social man, the discovered "natural laws" were certainly "objective", but for him they were "objective natural laws" only because of the existence of tools and the fact of labor. The tools — mental and manual — proved the "objectivity" of natural laws. But these tools were also products of natural forces that had determined their character. The interrelation between the status of the productive forces, of which science is but one among others, and that of insight into "natural laws" is inescapable. The "laws of nature" are thus "objective" in so far as man's capacity is able to deal with nature. This capacity is historical, and therefore all "natural laws" though "objective" are nevertheless historical laws,— whatever nature itself may be.

If nature exists independently of man, "our knowledge of the external world cannot be divorced from the nature of the appliances with which we have obtained the knowledge."¹⁹ To be sure, the transformation of nature into society, and of society into nature as accomplished by social production is not so simple as it might appear from what has been said here. It is clear that men knew about "natural mechanisms" long before machine techniques were able to influence their thought. The philosophers who developed the mechanical view of the world did not do so merely by projecting the ingenuity displayed in the productive process into their picture of the world, for most of them reached their conclusions long before the machine became really dominant. Neither were those scientists and philosophers imbued with a capitalist psychology, for that psychology arose much later. Behind their labors there were no "economic motivations" in the sense they could be found at a later stage of capitalist development that made science its direct servant. The mechanical view was a mathematical view, and mathematics existed long before machines were used. But precisely because "a mathematical formula can never tell us what a thing is, but only how it behaves,"²⁰ mathematics were particularly fruitful for scientific inquiries that concerned themselves first of all with the behavior of things. The mechanical age was thus a mathematical age. Yet neither the predominance of mathematics nor the development of machine techniques can by themselves explain the rise of the mechanistic view.

The mechanistic view that ruled science and philosophy depended, finally, on the whole of the development that changed the feudalistic into the capitalistic society, as well as on everything that occurred before. Simply to state this, however, is to say nothing. All understanding implies discrimination. To understand society, and the view of the world that prevails in it, one must select its most important aspects for investigation. Besides science and technology, other factors such as ideologies, traditions, class and property relations must be considered to develop theories which, though not exhausting the concrete reality, may still be sufficiently clear to serve the

19) A. S. Eddington, *The Nature of the Physical World*; p. 154.

20) Sir James Jeans, *The Mysterious Universe*. Pelican Books, 1938, p. 178.

practical needs of society. Science and technology are only two aspects, though outstanding ones, that enter the formation of thought. Although "distorted" when isolated, they serve well, if not best, to explain the rise of the mechanistic view of world and universe.

In a rapidly expanding economy the practical application of science is of prime importance. Thus the empirical side of science is stressed. Experimentalism is based largely on instruments developed in the course of research and in connection with the expansion of production and commerce. The continuous extension of man's power over the material resources of nature led to the belief that if more and more riddles are solved, all problems may finally be understood, provided the newly-found road to progress was consistently followed. The successes in mathematics and physics would be augmented by similar successes in other branches of science; mechanical principles would finally account for the whole of the universe. It seemed, indeed, that all the labor of the past had at last yielded the truth. After a long period of observation of the apparent nature and motion of things, man had seemingly come to recognize their hidden "real" nature, their "real" motion, and their "real" relationships.

The mechanistic conception of nature ruled physics to the end of the nineteenth century and played an important part in philosophy. For Descartes, the founder of modern philosophy, as for most of the scientific philosophers of the early capitalist period, nature was a mechanism and the human body itself a machine. The human machine in distinction to other mechanisms was, however, a thinking machine. It was "alive", whereas matter was "dead." Thought did not fit into mechanical conceptions. The soul and the body, matter and mind, were different but equally real. Descartes raised the question of the interrelation of these apparently unrelated entities. But despite the otherwise great complexity of his philosophical reasoning, this problem he "solved" quite simply by saying that God had willed things to be as they are — had willed, that is, the separation of matter and mind.

This dualistic view of matter and mind has never left the thoughts of men. There were thinkers, of course, who "simplified" the problem by explaining all things in terms of matter where others explained all things in terms of mind. Monistic views appeared in both a materialistic and an idealistic garb. But the mechanical view continued to dominate science and its existence "turned the harmless distinction between subjective and objective components of observation into a dualism of inner and outer world. And it is rather comprehensive that, under the influence of religious tradition, this dualism was more or less identified with the contrast of soul and matter."²¹

21) Edgar Zilsel, *Problems of Empiricism*. International Encyclopedia of Unified Science. Vol. II; No. 8, 1941, p. 69.

It is interesting to note that it was in England, the nation ripest for capitalist production, that dualism was first challenged. Robert Boyle, for example, saw the mechanical and the thinking world as part of one world and reasoned that though "it may be necessary to treat them as entirely separate from each other in order to bring the problem within the compass of human understanding; the separation is due to our need of simplifying the problem by treating it successively from different aspects. A better mind than ours might be able to see the world *staedily* and see it whole,²²⁾ To others like Hobbes, such problems did not even exist. They took sensation, thought and consciousness as mere phantasms caused by the action of atoms in the brain; the only reality was matter in motion.

Whatever the problem, one should be satisfied with the possible. And it was possible to change the actual conditions of life with the help of the science that furthered productivity. The key words of Bacon's philosophy, "Progress" and "Utility", became the slogans of the advancing bourgeoisie, whose real concern was the accumulation of wealth, and the pursuit of which took all their energies.

Of course, science was more than technology. It had to be in order to make technology possible. But it was more not because the mind was searching for "truth," but because "truth" was sought to foster technology. To restrict the search for "truth" meant only to concentrate on that "truth" that was of utility and that fostered the progress of capital. In technology the products of scientific research find their practical application. The rest of "truth", found gratis so to speak in the pursuit of capitalistic ends, did not matter very much. The bourgeoisie could be content with Berkeley's "salutary truths of the Gospel" as well as with the truth discovered by scientific research unhampered by faith. That phase of science that did not find practical application remained "philosophical" and served merely ideological purposes. About this phase of science there could be quarrels; it did not interfere with the scientific needs of capital.

Behind the philosophical controversies, however, there were again social conditions that had been altered through the application of science to production. The unbroken connection between medieval scholasticism and Descartes dualism corresponded with an incomplete transition from feudal to bourgeois society. The more complete "divorce" of science from religion in England was due to the success of capitalism there. The newly discovered "natural laws" found different interpretations. Newton's mechanistic cosmogony, itself the result of a long chain of discoveries leading back to Galileo, Kepler, and Copernicus, was for Newton himself, just as for his predecessors, no more than proof of God's great sense of beauty and order. But for the French Encyclopaedists it supported a materialism that denied the existence of God. There was a wide difference between the natural facts discovered and the kind of ideological garb in which they were attired.

22) W. C. D. Dampier-Whetham, *A History of Science*. New York 1931, p. 153.

Henry VIII and the Church of England had done away with the power of the papacy which tried to help maintain the feudal relationships. In France that power was still unbroken. Adapting itself only reluctantly to the capitalization of the world, the Catholic Church maintained as long as possible its control over science and philosophy. The capitalistically-oriented intellectuals, that is, the progressive forces in the Catholic countries, had not only to compete with the feudalistic ideology, but, in view of the strength of the Church, to reckon with religion to a far greater extent than had been necessary in England where a new, capitalistic church had fitted itself very well into the new reality. Whereas in France, as Adam Smith²³⁾ remarked, scientists could not enter the universities, in England the Church drew its best elements from the universities of scientists.

The "timing" between technological advancement and sociological conditions was somewhat different in France than in England. In the former, atheism was to play a great part in that country's capitalization process but a very small part in the latter. Of course, the philosophical issues discussed as well as the scope of thought depended on general conditions. But because capitalism did not develop simultaneously and with equal force in all nations, philosophies that in some countries were the last word in actual accomplishment forecasted a new era in others. The general philosophical and scientific heritage was differently reproduced and reinterpreted to fit numerous real and imaginary purposes. Class and group points of view, shifts in power relations, found expression in philosophy; and philosophy, in turn, consciously and unconsciously served class and group interests bound to specific social structures. The internationalization of science and philosophy, the interchange of ideas and experiences that progressed with the expansion of the exchange processes, allowed for feudalistic ideologies in capitalist nations, for capitalist ideas in backward countries, and for all sorts of mixtures of both. These and other reasons may explain the co-existence of different philosophies and different states of scientific development, as well as the variety of interpretations of specific philosophies and of the meaning of science during a particular historical period. Yet, all in all, it is clear that different nations recognized and interpreted general conditions with regard to their particular advance in the capitalistic development which, in turn, was dependent upon the degree to which science was practically applied in social production.

The Church had an economic base. Its own interests opposed other economic interests. For a long time Catholicism was practically the private business of a few powerful Italian families. Whatever did not suit the Church was brutally suppressed. It has been pointed out²⁴⁾ that one of the reasons for that memorable intellectual movement in the great commercial cities of Upper Italy that ushered in the Renaissance was the papacy's seventy

23) *The Wealth of Nations*. Modern Library Edition, p. 763.

24) J. W. Draper, *History of the Conflict between Religion and Science*. New York 1897, p. 291.

years absence from the Eternal City. The French-Italian rivalries that brought the papal court to Avignon in France fostered the freedom of thought in Italy, although the power of the Church remained unbroken. The Church, for some time a mere tool of the French, could in turn exercise the severest despotism in France. The first attacks of the emerging bourgeoisie had to be directed against the Church. Attempts were made to split Church and State, but during the reign of Louis XIV the State allied itself still closer to the Church, having recognized the common enemy in the rising middle-class. The attack upon the state was simultaneously an attack upon the ruling religion. The defeat of the Jesuits in France indicated the growing strength of the bourgeoisie; yet the weakness of the Jansenist movement — an attempt on the part of the upper layers of the bourgeoisie to adapt church and state to its own needs without resort to revolutionary measures — showed that the situation did not favor compromises. The revolutionary movement had already embraced too many layers of the population and the issues at stake could not be smoothed out merely by adjusting ideologies to the shifts of class forces.

England exported ideologies as well as commodities. But what in England was merely the natural science of an enlightened bourgeoisie turned, as French materialism, into a sharp weapon against the ruling classes. In England theology itself preached materialism; in France materialism was the mortal enemy of theology. God was not "supplemented" but displaced by the new "natural laws", because the bourgeoisie had yet to unseat the feudal lords. If Bacon, Hobbes, Newton, Hume could be both scientists and believers, in France the thinkers from Voltaire to Holbach and Helvetius had to be believers in science exclusively. French materialism was directed against all metaphysics because metaphysics was synonymous with theology.

Eighteenth century atheistic materialism took its starting point from Newton's cosmogony. With Copernicus, the earth had ceased to be the center of the universe. Newton ascertained that the planetary movements were determined by general mechanical laws. Thus the Christian conceptions of earth and universe were shattered, and the attack upon the clergy could be widened into an attack against religion. There was no need for reason and faith; reason was enough. Physical and mechanical principles would explain everything; some day the progress of nature might become predictable. The old atomistic theories were revived; Democritus and Epicurus found their place in the new materialism. Matter — the solid impenetrable Newtonian particles — was the ultimate reality. Descartes' immaterial sensations became Hume's material sensations. Man was a purely physical being. And it was soon thought that on a small scale man was only what nature was on a large scale. Whereas Locke had differentiated between sensation and reflection. Condillac reduced reflection to sensations. For Holbach matter itself was capable of thought.

Newton's countrymen accepted both his natural science and his Christian faith. "This English tendency to hold simultaneously beliefs which, in the knowledge of the time, seem incompatible", says Dampier-Whetham, "is a constant surprise to continental minds."²⁵ But there is no reason for surprise. The "secret" of this English tendency is not to be found in the "English character" but in Britain's unique position within the developing world capitalism. The "consistency" of the French materialists and the "inconsistency" of the English naturalists had nothing to do with "the knowledge of the time;" this knowledge was employed merely for different political purposes. Locke's and Hume's skepticism as regards the human ability to acquire knowledge, their willingness to exclude metaphysics from science without denying metaphysical thinking, could not serve the needs of the French Revolution. To be effective materialism had to be fanatic and dogmatic. As an instrument of change it could make no concessions to the Christian traditions without strengthening its mortal enemies.

Even if all impressions, conceptions, experiences stem from sensations; if the sensual world, the empirical world, is the only world there is; if in a materialistic sense, man is not free, because he has to adapt himself to natural facts, still the manner of adaptation was left to his decision. The materialistic determinism which put man into his place and pointed to his limitations, also showed him where and in how far he could be an active being. The materialistic doctrine, applied to social life, enabled man to see himself no longer at the mercy of uncontrollable forces but able to alter these forces through his own intervention. By recognizing his limitations, he recognized his potentialities. The French Revolution enunciated reason's ultimate power over reality. Thus mechanical materialism served both the ideological and the economic needs of the bourgeoisie. The natural sciences fulfilled spiritual and real functions in capital production. Living in capitalism, one accepted its science and philosophy as *science proper*, as the "true philosophy." One recognized this science, this philosophy to be true, because the new social relations, the new productive system, the new way of life were true.

METAPHYSICS AND EMPIRICISM

In relatively static societies there is little need for philosophy. Magic, or primitive religions, are reproduced without much alteration. It is true that all reproduction involves change, for repetition in an absolute sense is impossible, but these changes may be so gradual as to escape recognition for considerably long periods. The existence of philosophy indicates a swiftly changing society, relatively speaking, where traditional beliefs no longer suffice to serve the intellectual needs that arise through actual changes in social customs, class relations, and production.

Changes in class societies mean different things for different classes, groups, individuals. Some groups foster development; others hinder it; but

²⁵ *History of Science*, p. 214.

the latter groups have to change themselves in order to cope with the former groups and thus, even those opposed to change must change in order to oppose change. Consequently, changes may be hampered, though they cannot be prevented, for if they could there would be no social history. In one sense medieval conditions were changed by medieval conditions, for their reproduction incorporated change.

Change is continuous and manifold; one thing is also another, one activity another activity, one idea the reason for another. Though the unfolding of science, as we have seen, required its liberation from religious shackles, religious thought itself helped to remove those shackles. The "separation" of science from philosophy, demanded and effected by the increasing division of labor and the growth of the social forces of production, fostered the rapid development of science. Yet philosophy itself prepared the "divorce." Even the training of the intellect for the needs of science was both hindered and cultivated by medieval mysticism. Professor Whitehead points out that "the habit of definite exact thought was implanted in the European mind by the long dominance of scholastic logic and divinity. The habit remained after the philosophy had been repudiated, the priceless habit of looking for an exact point and of sticking to it when found."²⁶

Metaphysical philosophies did not prevent the advancement of the sciences that are directly related to the socio-economic development. They searched beyond the observable phenomena for the "deeper meaning" of human existence. In their attempt to render comprehensible the mysteries of the universe, they tried to bring "sense" out of the bewildering world of facts, "order" into the welter of ideas. As long as it was thought that God determined everything, philosophy was necessarily a sort of advanced or "critical" religion. It sprang from the reproduction of religious beliefs in changing circumstances. It tried to reconcile apparently "contradictory" processes of thought and action, to reconsider the past in the light of new revelations and added experiences either to give new strength to time-worn beliefs, or to fit them to the new developments.

The materialism of the eighteenth century, however, attempted to end metaphysics. Even for the English materialists "theism became nothing more than a convenient and easy-going way of getting rid of religion."²⁷ The question of physics and metaphysics was one of religion and anti-religion because of the long history of religious thought and the existence of the Church as a social force. The problem of matter and mind split philosophy into idealism and materialism. That there were both, matter and mind, was clear. Those who attributed matter to mind and those who attributed mind to matter were equally unconvincing. The question boiled down as to what existed first, matter or mind. In practical affairs, of course, neither the one nor the other conception played a real part, but because each served

26) *Science and the Modern World*, p. 23.

27) K. Marx, *Selected Essays*, p. 190.

ideological needs, they influenced the character and movement of society. For the needs of human life the "problem" is meaningless. It could only be posed, and the opposing factions developed, through the class structure of society. It was important to one class in society to maintain that mind was first and matter second, and important for another class to maintain the contrary.

In England the capitalist mode of production was safely established some time before the decisive struggle for it disturbed the Continent. The English bourgeoisie was over its storm and stress period; revolution, civil war, dictatorship, the Puritans, the Levellers, Cromwell, were history. A period of relative stability led to the belief that a form of society and a system of production that corresponded best to human needs and capacities had finally been found. But the memory of the bloody religious, political, social, and economic struggles in the middle of the seventeenth century was an additional reason for declaring that the new status of society was the true status. The fact that the beheading of one King had led only to the crowning of another, that, despite all class struggles, class relations continued to exist, led to a new static attitude in regard to the problems of humanity. "Mankind are so much the same, in all times and places," wrote David Hume, "that history informs us of nothing new or strange in this particular. Its chief use is only to discover the constant and universal principles of human nature, by showing men in all varieties of circumstances and situations."²⁸

The problem of matter and mind had been raised in the search for ultimate truth, and idealists and materialists spoke in absolute terms. The discoveries in the natural sciences, however, were not doubted by either group. Cartesian physics, mechanical materialism, remained the basis of all subsequent science. When Descartes' pupils, not to speak of his antagonists, were already greatly dissatisfied with his dualism and attempted to explain mind with the same materialistic principles that had been generally accepted in physics, the whole discussion took a different course with Locke and Hume. The latter declared ultimate problems to be unsolvable ones, as not belonging to the world of science, that is, the world of the senses, of appearance, of phenomena. They contended that reason deals with the empirical world, and that what concerns ultimate reality is a question of faith.

This way of thinking, of course, was not new, since the idea had been held by the Nominalists since the fourteenth century and was not unknown in antiquity. The Nominalists favored the divorce of science from religion. To favor this separation was to oppose the Church. But though the Nominalists were limited by the strength of the Church, they succeeded in clearing the way for capitalist materialism, atomism, mechanism, sensationalism as well as for Hume's skepticism. The philosophical advance from William of Occam to David Hume is not great, but the weight of Hume was to be

28) *An Enquiry Concerning Human Understanding*. Chicago, 1935, p. 86.

felt in extraordinary measure because of changed circumstances. Hume's division of reason and faith found a period and a society in which the independence of science was an accomplished fact. This division was no longer detrimental to the interests of the Church. In fact, it saved the Church from the onslaught of science, whereas in Occam's case science had to be safeguarded against religious dogmatism. "Theism", apparently "an easy-going way of getting rid of religion," as Marx said, was in reality a subtle way of maintaining it. "To be a philosophical sceptic," wrote David Hume, "is the first and most essential step towards being a sound, believing Christian."²⁹

Hume was interested not only in the problem of human understanding, but in that of society as well. He was a friend of Adam Smith and shared his economic views.³⁰ Though not an atheist, he dined with pleasure with the godless French materialists, for he shared their antipathy toward the squandering nobility. Though he respected the less expensive Catholic clergy and though he was happy that in England one could open up a new religion as easily as a pub, he thought it wise to put the clergy on the payroll of the state, because "in this manner ecclesiastical establishments, though commonly arising from religious views, prove in the end advantageous to the political interests of society."³¹ And the political interests of society were those that served the economic needs: order and industry. Thus he favored everything that favored the existing bourgeois society, convinced that this society was best suited to human nature — such as it is.

Bourgeois society is based on private property. Feudalism, too, was based on private property. However, private property in the form of capital was something other than the possession of land and control over serfs. First, it was the property of a new class; second, it was property not based on, nor limited by, the conditions of the past, the accident of birth, nor that of location. It was the property of the future, the result of "individual enterprise." It was property competing with property, flexible, changeable, growing. It was property, furthermore, that yielded greater results than agricultural exploitation, and that developed industry and a world economy. It contained the promise to exceed all hitherto existing social and human conditions. Therefore to prevent or hinder its expansion was utterly unreasonable; to support it was to follow the demands of reason.

29) *Dialogues Concerning Natural Religion*. The English Philosophers from Bacon to Mill. Modern Library, New York 1939, p. 764.

30) "Commerce and manufacturers," wrote A. Smith (*Wealth of Nations*, p. 385), "gradually introduced order and good government, and with them, the liberty and security of individuals, among the inhabitants of the country, who had before lived almost in a continual state of war with their neighbours, and of servile dependency upon their superiors. This, though it has been the least observed, is by far the most important of all their effects. Mr. Hume is the only writer who, so far as I know, has hitherto taken notice of it."

31) Quoted by A. Smith in *The Wealth of Nations*, p. 743.

The "hero" of this new social order was the individual capitalist. If he combined with others, he did so for political reasons contingent on his unfinished fight within feudalism. The only "unity" he knew was the unity of struggle against his enemies. This was regrettable, but was determined by those forces clinging to the past which refused to give way to reason. With the triumph of reason there would end all need for unity, for common action, because the self-love and self-interest of the individual constituted the principle that assured the welfare of the whole of society. "By directing industry in such a manner as its produce may be of greatest value," wrote Adam Smith, "the individual intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interests he frequently promotes that of society more effectually than when he really intends to promote it."³²

It was believed that the exchange relationship, competition, and the law of supply and demand regulated the economic life of society in a just and roughly equalitarian manner. The price mechanism harmonized production and distribution and satisfied the needs of the people. General competition assured identity of value and price, if not immediately and in each case, then generally and in the long run. This system increased the productivity of labor, assured the greatest economy, and increased the wealth of nations. There was no strictly economic reason for any sort of pessimism; a happier future was assured.

The individual, not society, the particular, not the general, the part, not the whole was worth attention. The rest could be left to that "invisible hand", i. e., the mysterious result of material actions that themselves could not be described in material terms or grasped by empirical means. The "invisible hand" was taken for granted: the methods of science failed in the sphere of socio-economic activity. The "invisible hand" was, like the "ultimate reality", — or vice versa — a matter of faith, transcending experimental science. This ideology of commodity production was bound to influence the thoughts of Hume, as one of its strongest supporters.

The science of the bourgeoisie was natural science. There was no science of society. Economy was merely the recognition of the widening division of labor and its productive results. By organizing the labor process and by employing the machine one created more products in shorter time, and, with the increase of production, lowered their value. All this did not demand a science of society. These were observable facts. To comprehend and systematize them it was enough to employ the methods used in the natural sciences.

The question of human understanding had always been one of mind and nature; hence the identity on the part of Greek stoicism, the Nominal-

32) *Wealth of Nations*, p. 423.