Marxism: A Scientific Philosophy Of Life

The Nature of the Scientific Method

(The first of a series of articles on Marxism and Science written by members of the Editorial Board of the Review.)

by FRANCIS FRANKLIN

ALTHOUGH many people think that Marxism concerns itself only with economics and politics, it is, in reality, a thorough-going world-view. When Sidney Hook, a Trotskyite professor of Philosophy, states in a symposium on *Contemporary American Philosophy* that he can see no connection between the dialectics of the growth of oats and the dialectics of the class struggle, he indicates his complete inability to understand Marxism. The findings of every science form a part of the ever-growing and ever-deepening Marxist view of the world. This means that Marxism deals with the motions of the stars, the formation of the rocks, the growth of trees, as well as with the destiny of human life.

But all theory arises from the need to know how to live, how to obtain our wants, how to shape our destinies. Theory is not mere contemplation, but a guide to action, and it is only by action that theories can be proved or disproved. While Marxism seeks to comprehend the whole world, it *focuses* its attention on the needs confronting us as human beings.

MARXISM COMPREHENSIVE

Marxism is the world-view and the way of life of an organized social movement—the modern revolutionary working-class movement. It is furthermore the outgrowth of a great intellectual tradition, the tradition of modern natural science, which itself is the outgrowth of the whole history of human thought, stemming from the earliest days. Marxism is not the brainchild of a single thinker. It is the collective outgrowth of the entire history of science and philosophy. It has made its own every genuine intellectual achievement from the days of the first thinkers until the present. As the philosophy of the world-wide Communist movement, it is constantly being developed and applied collectively in the endeavor to re-make the world, through which it is destined to become the common philosophy of a united humanity. Every step in the battle to re-make the world deepens and enriches the Marxist world-view. Therefore, it is no narrow set of doctrines, but a philosophy which grows as science grows. It is consequently a philosophy to whose development there can be no end.

The revolutionary movement today differs from all revolutionary movements in past periods of human history, in that for the first time the development of the forces of production has made possible a life of abundance for all. The modern revolutionary movement also differs from preceding movements in that, with the general development of science, there has also been developed a science of human society, which makes it possible for the first time consciously to control and guide social development on the basis of a correct analysis of the laws of social movement. Thus modern natural science forms a *distinguishing characteristic* of the modern revolutionary movement.

A SCIENCE OF SOCIETY

In addition to being the science of society, Marxism makes its own all other sciences. It unites its own science of social development with physics, chemistry, astronomy, geology, biology, psychology, and thus for the first time establishes a unifying, comprehensive scientific philosophy. It discovers within all the sciences similar laws of movement and development, which express themselves in such diverse phenomena as the movements of the stars, the ebb and flow of the tides, the evolution of life, and the rise and fall of empires.

But what do we mean by science and scientific method? And how did modern science arise?

There is nothing mysterious about science, although it is by no means simple. Scientific method involves securing correct explanations of the movements of the world through careful study of the world itself and through the rigid testing of the explanations obtained. It cannot be developed by mere dreaming; although, without a certain type of imaginative thought there would be no science. Scientific method implies certain clearly-defined methods of procedure. These methods are employed not only in the laboratory, but wherever men have obtained knowledge which has enabled them, within limits, to control nature.

PRIMITIVE EXPERIENCE

The primitive tribesman who had just begun to farm was undoubtedly puzzled when his crops dried up and withered. Although today we know, without thinking about it, that lack of moisture causes crops to wither, this was not necessarily so clear in primitive times. How could the early farmer have arrived at this conclusion? From careful observation, he undoubtedly noted that crops withered after long periods of drought. This was still not absolute proof that lack of water causes withering. Events may follow one another without a cause-and-effect relationship being present. In order to verify the explanation suggested by his observations, our primitive farmer would have had to check his hypothesis (suggested explanation) experimentally. He could do this only by drawing conclusions from his hypothesis, such as the following, "If lack of water causes my plants to wither, then, if I bring water to my withering plants, they will revive." To check this conclusion, the farmer would actually have had to bring water to his plants. By doing so under controlled conditions, so that there could be no other changing factors which might cause the plants to revive, and by actually observing the revival of his crops, the farmer would be justified in concluding that he really knew what caused the wilting of his crops. He would have put his hypothesis to the test and could well conclude that it was a correct theory.

SCIENTIFIC PROCEDURE

This is a simple example of scientific method, but it follows, essentially, the same procedure employed in the most highly-developed laboratories. This procedure involves the following phases:

1. The development of a scientific theory is stimulated by the existence of a *problem.*

2. The solution of the problem demands the study of all possible data bearing on the problem. This necessitates careful *observation and gathering of information.*

3. Careful observation demands precision and exactness in noting differences. There are two types of differences—those of quality and those of quantity. Noting the former demands the ability to classify. Early science involved the intensive development of methods of *classification,* such as that employed in biology (species, genus, class, order, phylum, etc.). Quantitative differences demand the development of methods of *measurement.* This meant the development of mathematics as the science of measurement, which is used by all the natural sciences.

4. Upon the basis of careful observation (involving classification and measurement) it is possible to develop an *hypothesis* (suggested explanation) which covers all the known facts. It is in the formation of the hypothesis that imagination is important. A scientist may study a great mass of facts all his life; but he must see them all together, he must use imaginative effort to grasp the significance of the differences between them, before he can evolve an hypothesis explaining their relationship. If the hypothesis, so devised, is contradicted by a single fact, it is not entirely correct. Several hypotheses may be developed to explain one phenomenon, but only because not enough is known about the phenomenon. There can be only one correct explanation of any one event. If several hypotheses are developed, further observation or experimentation, if carried far enough, will necessarily uncover facts disproving all but one of them or else all of them. It is a generally accepted principle that, if there are two hypotheses which cover all the known facts, the simpler explanation takes precedence over the more complicated.

5. After the development of an hypothesis, it must be tested. This involves drawing as many conclusions as possible (*making deductions*) from the hypothesis. If the hypothesis itself is true, then all the conclusions drawn from it can be checked by experience. (If drought causes withering, then irrigation will prevent it. This can be checked by actually irrigating fields of withering plants.)

6. In order to check the deductions drawn from an hypothesis, *controlled experiments* must be conducted. To determine whether a certain event is the result of a certain cause, it is necessary to observe the occurrence of that event under *controlled* circumstances, so that in one case the hypothetical cause is absent, while in the other it is present. In both cases all other conditions must be unvarying.

A famous example of a controlled experiment was the experiment performed to determine whether it was the bite of the female anopheles mosquito which caused yellow fever. In order to determine this, certain heroic men, who offered their health for the sake of the experiment, voluntarily placed themselves in carefully screened cottages. For a number of months, they lived under conditions as nearly identical as possible. Subsequently, female anopheles mosquitoes were introduced into certain of these cabins, while the men in the others continued to live as before. When only those men who had been bitten by the mosquitoes contracted yellow fever, it was clear indication that the cause of the disease had been discovered.

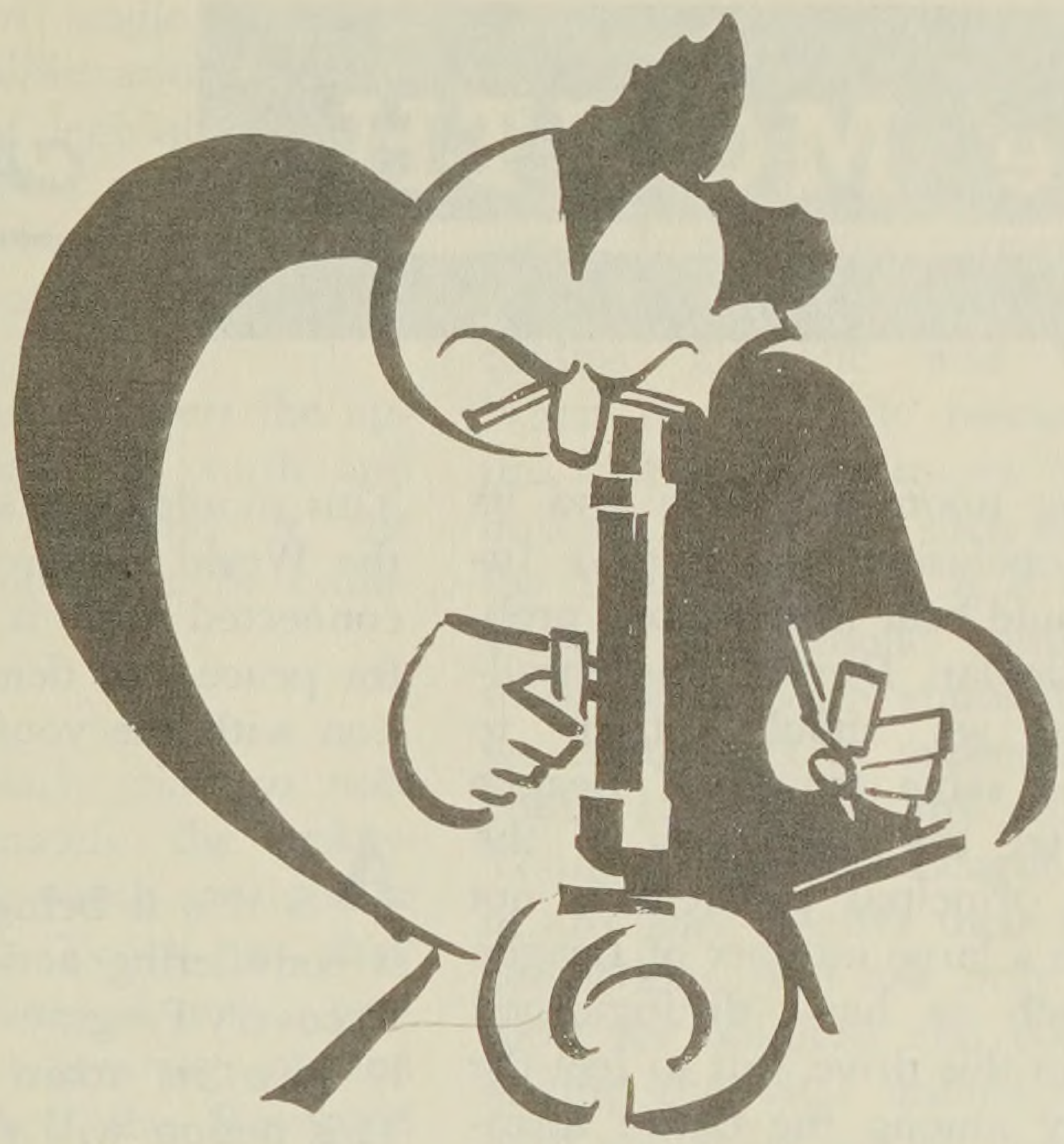
7. If a large number of conclusions drawn from an hypothesis are not contradicted after repeated tests by observation and experiment, it may be assumed that the hypothesis gives a true explanation of the events being studied. This procedure constitutes the *verification* of theory. Future discoveries may require the modification and correction, or the deepening and extension of the theory, but such testing indicates its essential correctness.

IN MODERN TIMES

It may be said, then, that science is a process which involves precise and systematized observation, the formation of hypotheses, rigid deductive reasoning, and critical verification of hypotheses through their actual experimental application.

Our ability to build railroads, manufacture goods, illuminate cities by electricity indicates that, while our knowledge is still very limited, we do possess a certain amount of actual knowledge of the laws of physics, chemistry, etc. which have been used in these accomplishments.

Why is it that science has been developed to such a large extent only within modern times?



Nathan Pearlman

We have seen that even the most primitive methods of production require some actual knowledge of nature. But science is limited as the forces of production are limited, and *vice-versa.* Thus it was not until the rise of modern capitalism, which introduced the Industrial Revolution, and thus developed the means of production to a previously undreamed-of degree, that science, without which the Industrial Revolution could never have taken place, began to be developed on a truly vast scale.

The social system of the Middle Ages rested on agriculture, which was carried on by the most backward methods. The feudal landlords had very little need for science. On the other hand, they relied on holding the masses in the deadliest fear of superstitious powers as a means of keeping them in subjection.

Superstition is the very opposite of science, since it does not arise from precise and systematized study of the actual world. Non-scientific theories arise originally as a result of ignorance. Just as a dog pounces on a leaf blowing in the wind as though it considered the leaf alive, so, in early times, man tended to consider all things that moved as possessing life similar to his own. Thinking that his supplications could influence nature, he cursed the stone that struck him, blessed the sunshine and pleaded with clouds to give forth their rain. To him, all things were endowed with life, which his entreaties, if offered correctly, could move.

As exploiting classes arose, they made use of these non-scientific ways of thought to gain control over the minds of the toilers. If the workers were to be held in subjection, it could be only by the employment both of physical and spiritual terror. Thus, there were two types of exploiting classes in early social systems—warriors and priests. The former maintained their power by force of arms. The latter presented themselves as specialists in ability to control the spirit-world. Those who desired health, good crops, and prosperity, were made to believe that they could obtain the favors of heaven only by obeying the will of the servants of heaven, the priests. If they displeased the latter, then they could expect dire misfortunes as a result of the priests' control over the spirits.

AGAINST SUPERSTITION

The scientific study of nature disproves the superstitious doctrines by means of which priestly classes have either ruled or aided the rule of other exploiting classes. The exploiting classes before the rise of capitalism had always opposed any general development of science. Whatever science was developed, they wanted to keep as their own private property. Only for a short time in ancient Greece and Rome, when capitalism first began to rise to a limited degree, did natural science begin to be developed. But when this early premature capitalism succumbed to the backwardness of most of the vast areas of the Roman Empire, which had not even gone through the period of feudalism, the growth of science also subsided.

Since the development of science exposed the superstitious doctrines of the pre-capitalist exploiting classes, these exploiters always persecuted with the utmost fury those who attempted to further the cause of science. The development of science was, therefore, revolutionary. It attacked and destroyed the theories by means of which ruling classes maintained their systems of exploitation.

PERSECUTION OF SCIENCE

Feudal landlords, with their backward agricultural economy, had little need of science. Their theoreticians spent most of their time inventing theories about heaven, hell, angels and devils. The rising merchant capitalists at the beginning of modern history, however, needed to know a great deal about this material world. They needed to find trade routes, sail the seas, obtain minerals from the rocks, and afterwards to learn how to manufacture. Thus the rise of the modern capitalist class was accompanied by the scientific study—not of heaven—but of this earth itself. With fury born of fear, the medieval church persecuted the early scientists. Bruno and many others were burned at the stake; Galileo was hailed before the Inquisition for writing that the earth moves around the sun. The struggle between medieval superstition and modern natural science was part of the class struggle between the feudal landlords and the rising capitalist class.

In the next article, we will deal at greater length with the rise of modern natural science. We will see how capitalism, caught in the network of its own basic contradictions, has, even while developing science, itself made use of superstition to maintain its own rule. We will see further that only the revolutionary working-class, inheriting all the science organized by a progressive capitalism, can burst through capitalist limitations to develop science and knowledge to the greatest possible extent.