Special Series:
Short Biographies of Philosophizing Chemists (3)

Robert Havemann (1910-1982)

by Klaus Ruthenberg

Born in Munich, Robert Havemann studied chemistry in Munich and Berlin from 1929-1933. In Berlin, he received his doctorate (Dr. phil.) in physical chemistry with a thesis elaborated at the Kaiser-Wilhelm-Institute of physical chemistry and electrochemistry (the precursor of the Fritz Haber Institute of the Max Planck Society) in Berlin-Dahlem. In the same year, Havemann was removed from this prestigious institute by the Nazi government because of his membership of the German Communist Party (KPD) since 1932. He became scientific assistant at the University of Berlin, where he earned his *venia legendi* (*Habilitation*) in 1943. Because of his collaboration with the Resistance movement he received a death sentence by the notorious Volksgerichtshof the same year. Instead of executing the capital punishment, the government forced Havemann to do research of military importance in the Brandenburg jail. In 1945, he became head of administration of the Kaiser-Wilhelm-Institutes in Berlin. Again, the appointment to that institution turned out to be unlucky: two years later he was discharged by the Office of the Military Government of the United States of America for writing a critical newspaper article on the American hydrogen bomb. As before, he changed to the university (1952, on recommendation by Karl Friedrich Bonhoeffer), this time to the Humboldt-University in the eastern part of Berlin ruled by the German Democratic Republic (GDR), where he became director and chair of the physico-chemical institute. He held that position until his dismissal in 1964. Since about 1956, Havemann has been publishing critical essays both against scientific and political doctrines prevailing in his country. Havemann considered the dogmatic convictions of Stalinism, as it was called even outside the USSR, as aberrations from original dialectical materialism. His development toward a political dissident by criticizing the official doctrines culminated in his lectures *Naturwissenschaftliche Aspekte philosophischer Probleme*, held at the Humboldt-University during the winter term 1963/64. Immediately after the lectures were finished, in March 1964, he was dis-

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charged from his job at the university – officially due to an interview with a West German newspaper. Soon he got an appointment at the academy of sciences as leader of a photochemistry group, that he had already honorarily led before; but lost it in 1966, again due to a West German publication. From his last dismissal until his dead he lived in his house at the village Grünheide near Berlin (GDR). He was permanently kept under surveillance (partly electronical), and several times even in house arrest. After a long time of suffering from a serious lung disease, Robert Havemann died in 1982.

Havemann's main scientific interests were in protein chemistry, magnetochemistry, and photochemistry. He published more than 100 articles, one textbook on thermodynamics, several political and philosophical articles and books. Philosophically, Robert Havemann stood on the grounds of dialectical materialism. He was convinced of the primacy of matter over ideas and that natural changes are driven by dialectical contradictions, such as those between equality and difference, quality and quantity, continuity and discontinuity, possibility and actuality, necessity and contingency, etc. These cases were discussed in the 11th lecture of his lecture series from 1963/64, published with the title *Dialektik ohne Dogma?* (Rowohlt Taschenbuch Verlag: Reinbek bei Hamburg, 1964, 169 pages). In these lectures, Havemann dealt with the following topics: objective idealism and mechanical materialism; cybernetics and thinking; the space-time model of perception; evident and abstract thinking; limitedness and infiniteness time; elements and problems of quantum mechanics; contingency and necessity-possibility and actuality; the incompleteness of the Copenhagen interpretation of quantum mechanics; possibility, actuality, and causality; freedom and necessity; freedom, consciousness, and ideology; on morals; dialectical materialism and the sciences; on questions of morals; on questions of socialistic morals; is there a system of dialectics? The book contains also his speech "Hat Philosophie den modernen Naturwissenschaften bei der Lösung ihrer Probleme geholfen?" (Did philosophy help modern natural sciences solve their problems?), held in September 1962 at a conference on progressive traditions in German science of the 19th and 20th century at Leipzig.

In *Dialektik ohne Dogma?*, Havemann discussed general problems of the relations between philosophy and the natural sciences rather than specific areas or theories, with the exception of quantum mechanics. Hence, chemical topics are quite rare in that book. However, one chemical example is Pauling's resonance theory and it's rejection by leading Soviet scientists (pp. 13-14, 129-130). The latter rejected resonance theory because of its introduction of mesomeric structures that are not real and therefore not in accordance with the principles of materialism. Havemann said: "This critique reveals a failure in the area of philosophy. That does not mean that the resonance theory as a developing scientific theory could not be revised by further

developments […]. Different mesomeric structures are described by resonance theory, only in the dialectical sense, as not yet real, but as possible structures according laws […]. I have dealt with this relation between possibility and actuality exhaustively in my lecture already. But nature is not strictly and monodimensionally determined with regard to what becomes actual. […] That is dialectical materialism, the former criticism of Pauling's theory is however vulgar mechanical materialism" (pp. 129-130).

Referring to the headline question of his Leipzig speech, Havemann gave a negative answer. He claimed that natural scientists should study philosophy – all kinds of philosophy rather than only dogmatic state philosophy – systematically: "By no means it can be the effect [of studying philosophy, K.R.] that somebody writes a textbook entitled 'The Dialectical Materialism', which then contains everything what 'the' dialectical materialism says […]. We must start from things, we must study nature itself, we must directly discover its dialectics in its specialties, not yet in its generality" (pp. 16-17). Hence, Havemann was a pronounced opponent of the official doctrine according to which philosophy is placed over the sciences in order to direct them (which, incidently, violates the Marxist and materialist formula 'being determines consciousness').

Another book that to some extend is pertinent to philosophy of chemistry is his textbook on thermodynamics (*Einführung in die Chemische Thermodynamik*, VEB Deutscher Verlag der Wissenschaften: Berlin, 1957, 296 pages). Referring to several philosophical topics discussed in that book, he stated in the preface: "I am convinced that a real understanding of general and philosophical questions is a sure proof that the reader has also deeply searched through special disciplinary problems" (p. V). In fact, this book is a rare example among thermodynamical textbook that discusses at all philosophical issues; and it is perhaps the only one – apart from those who refer only to the 'classics' Marx, Engels, and Lenin – doing that from the point of view of dialectical materialism. Two topics will be chosen for the present contribution: the quality/quantity discussion, and the *Wärmetod* hypothesis.

The transition from qualities to quantities and *vice versa* is a central issue – some authors call it a law – of dialectical materialism. During his introduction of entropy and the Gibbs enthalpy (which combines the first two thermodynamic principles), Havemann stated that a newly synthesized compound is not only new with regard to energetic quantities, but also new with regard to characteristic chemical properties. "Quantitative change of energetic values and chemical composition always means a decisive qualitative change of material conditions. The energetic difference between two compounds only characterizes one distinct part of the differences between them in a uniform measure" (p. 133). Then he claimed that although there is not but one law to describe the driving forces of chemical reactions, thermodynamics is

still able to demonstrate the transition from quality to quantity. As far as the author of the present biography is concerned, it appears promising to apply the quantity-quality concept to problems in philosophy of chemistry, because, for example, chemistry can be described as a science of qualitative changes, on the one hand, and as a science that applies quantitative methods (like those from physical chemistry) to investigate these qualitative changes, on the other.

The application of the entropy principle, the second law of thermodynamics, to cosmological dimensions has led some scientists and philosophers to the assumption that the world runs into a global chaos at an average temperature. This assumption is called the *Wärmetod* hypothesis. Havemann argued both against this hypothesis and some former critical arguments against it. Against the *Wärmetod* assumption he objected that at least one precondition of the entropy principle is not available in universe, namely the possibility of a thermal equilibrium. Referring to the dialectical triad thesis-antithesis-synthesis, he concluded: "Obviously the entropy principle is – in a dialectical sense – embedded [*aufgehoben*] in a law of nature that is even more general, which determines that energy in the form of rest mass always heads for spatial concentration due to gravitation, and energy in the form of radiation (without rest mass) always heads for dissociation and dissipation" (p. 164). Some opponents of the *Wärmetod* hypothesis had claimed that the latter is not correct because the entropy principle is valid for closed systems only, whereas the infinite universe is not a closed system. Against that Havemann argued as follows: All natural laws are bound to certain preconditions. Only because at least one of these preconditions, the possibility to reach thermal equilibrium, is not given for the universe, the entropy principle cannot be applied here. It is that non-applicability rather than a "metaphysical quantity-quality-jump between finite and infinite" (p.165) that should be used as an argument against the *Wärmetod* hypothesis.

Robert Havemann was an independent and, in the best sense, unconventional thinker, and for the political leaders (not only) of the GDR he was a very incommodious philosophizing chemist, as well. In the very year Thomas Kuhn's famous book was published, Havemann said, as concluding remark of his Leipzig speech, something almost anti-Kuhnian, which must have been a direct slap in the face of the state philosophers: "We will overcome the narrow-mindedness and sterility in the area of philosophy as soon as also our philosophers will experience the greatest possible happiness, if something is discovered in reality that is inconsistent with their former opinions" (p. 20).

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