

Hollender, Henryk

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Henryk Hollender (Poland)

ON THE PLACE OF SCIENCE HISTORY IN HISTORICAL SYNTHESSES
(SOME THOUGHTS ABOUT HISTORY TEXTBOOKS)

I

Why is it so that apart from history — without a qualifier — there are such disciplines as: economic history, science history, history of literature, of books, etc? We should either recognize that „general history” is, so to say, an arithmetical sum of all historical sciences, that their scopes form together the scope of „history”, or decide that it is a separate science, at most, using the results of the individual historical sciences, or still consider history as a science of synthesis of our general knowledge of the past, thus depriving the political historian, the economic historian or the cultural historian of their licence to proceed with such syntheses.

Contemporary methodology of history, both structural and dialectical, has widened the scope of our thinking about the past. The exclusion from the science called generally „history” of such subjects as, for instance, science history would place the latter in a rather awkward position. In academic textbooks of history we are, therefore, encountering an ever wider discussion on all fields of social life. And there is a decreasing tendency to attach to one of them a leading significance, as compared with the other.

One may think that all historical disciplines are only variations or parts of economic history, political history or cultural history. The dominating position of political history which still appears quite often in some historical syntheses could eventually be considered as a relict of the past models of historical enquiry. The first, so-called pragmatic, has been developed in ancient times and followed through the Middle Ages; it considered history's main task to be the presentation of recommendable patterns of human behaviour by political or ecclesiastical figures. In the succeeding models of research and teaching developed later the pragmatic

model lost the tendency to push to the fore the thread of political events as the sole or determining factor. And this had its impact on the composition of historical works. It may, therefore, be of interest to look at some university textbooks on general history most frequently used in Poland and considered to be the most representative of the historiography of their times.

Thus, for instance, in the *Modern History* by Tadeusz Korzon (the first volume of which was first published in 1889 and the second — in 1903) it is extremely difficult to find any desired information, while to reach with the aid the table of contents some fragments devoted, for instance, to the history of science is almost impossible. The textbook has, none the less, great narrative and literary value and can therefore be recommended above all as interesting reading material. Even the *Great Universal History* published in the thirties under the direction of Jan Dąbrowski is an example of narrative historiography; the concept of „history” is to a large degree confused with that of narrative history.

The same is not true as far as the most recent textbooks are concerned. The conviction about the inherent interrelations linking all elements of social life is reflected in the history books which treat the reconstruction of the past as a sum total, including all problems known to the researcher. The structure of such a textbook corresponds to a *sui generis* factual classification and its table of contents — to a pattern of that classification. In the subsequent three volumes of *History of Poland* published by the Institute of History of the Polish Academy of Sciences it is very easy to find all desired excerpts and the titles of chapters are, in themselves, the shortest résumé. The whole content is presented in accordance with the following pattern: economy, society, internal and external policy, culture. It could be said that history textbooks, renouncing continuity of narration, acquire in that way the character of an encyclopedia with a systematic structure. Thus, the process of the gradual formalization of the structure of university textbooks reflects their gradual departure from the form of a literary work in favour of a publication resembling a reference book.

II

The idea of having a general history textbook containing all necessary information on science history may seem attractive. There would be no need for a background, which an author of a textbook devoted to science history only would have to paint, for such a background would be provided by the remaining content. Furthermore there would be no problems usually connected with the artificial delimitation of the discipline of science history. Finally, a science history textbook in a given country, written with a view of offering positive statements and not of hiding

facts, may have a tendency to attach artificially certain meanings to certain facts, to „smooth” so to say the rough angles in the presentation of various periods in the development of science, thus balancing their significance, although there may have been periods in the history of a country in the course of which there was a regress in the evolution of science, with the „general” historian left with nothing to write about. In a textbook on general history consideration of science history would then give way to the presentation of the wars waged during that period, to the discussion of economic development, religious life, etc. Another advantage of a general history textbook is the possibility it offers to connect science with social life, to treat science as one of the forms of intellectual activity. Such a demonstration is much more difficult to achieve in a textbook dealing only with science history. For only the general historian is given the chance to discover in the maze of events such facts which — left aside by the science historian — occupy as important a place in the consciousness of a given society as facts generally considered scientific.

However, even a preliminary analysis of the content of history textbooks justifies the contention that they fail to live up to such expectations. A contemporary textbook with its particular chapters written by specialists proves to be very often a heterogenous collection of incoherent fragments. The question arises as to whether they can provide the basis for a synthesis, as to whether, for instance, the author writing the introduction or the conclusion of the part devoted to culture has the possibility to draw some general ideas from the conclusions presented by the historians of literature, music science, etc. As a matter of fact the question concerns the material gathered and research instruments used in presenting particular subjects with a varying degree of generalization. Should the text dealing with culture as a whole contain a simple recapitulation of the material discussed in specific chapters, or should it be concerned with another subject calling for the application of a different conceptual apparatus?

It seems that a partial answer to that question lays in the problem of terminal periods. As a rule, the structure of the content of history textbooks is, above all, chronological, and only in the second place factual or territorial. The author of a science history would, generally, receive the task of writing a chapter concerning science history in a given period on a given territory. The period, territory, nationality of scientists, etc., would have been fixed by the editor-in-chief who is most often a “general” or political historian, and who by the sheer weight of his authority plays the role of co-ordinator and synthesizer, whereas the science historian may have his own views on chronological divisions most appropriate for his subject, and the nationality structure of the scientists co-operating directly or at a distance may not coincide with the nationality structure of the population of a given territory. Thus, the specialist co-operating

in the publication of a general history is condemned to write fragmentary chapters, to disregard the continuity of his considerations, to adopt the same chronology and the same general concepts which may be appropriate for the writer of political or economic history.

On the other hand, the acceptance of the principle that each specialist produces his own general conclusions, with no regard to imposed chronology and classifying concepts, would lead — if applied with consistence — to the creation of a textbook representing, under the same cover, a collection of parts written independently. The question remains open as to whether the collection would be homogeneous enough to supply the basis for a synthesis arrived at by the way of gradual higher and broader generalization.

Older textbooks published at the end of the 19th century and during the first half of the 20th century have very often quite ingeniously related science history to social change, treating their subject in the same manner. However, they were not free from factual mistakes and the method of selecting problems for consideration is debatable since from the history of scientific thought these textbooks used to select only such problems which could be related to past history and present achievement. The easiest thing for the historian is to concentrate on a theory which is popular at his time and to oppose it to another theory which refutation adds only to the prestige of the former. Theories and discoveries that arose no controversies are usually left out, together with precursory and unverified ones.

History textbooks have also a tendency to approach science as a continuing series of theorems which are not formulated but discovered. For the majority of historians the work of scientists represented a demonstration of ready, immutable, objectively correct or objectively false theses. Here are some simple formulae: „Bacon made no distinction between chemistry and alchemy, astronomy and astrology”¹; “There are many shortcomings in the work of Montesquieu”²; “Archimedes was also familiar with the differential calculus”³. There is a tendency to compare all past scientific judgements with the state of science of the historian’s own society, to qualify them as either adding to that patrimony or false. Human science is thus considered as a cumulation of knowledge which grows gradually and upward.

A history textbook is a product of social sciences. In view of the fact that such a cumulative approach to the history of science is also characteristic of the representatives of natural sciences it may be worth-while examining whether these approaches differ and in what way. A reply to

¹ *Historia Powszechna* (Universal History), Edited by M. Sokolnicki, Vol. 2, Warszawa, 1932, p. 435.

² *Ibid*, Vol. 3, p. 1372.

³ J. Wolski, *Starożytność* (Antiquity), Warszawa, 1965, p. 297.

that question would permit to formulate some conclusions concerning the possible application of methods of social sciences to the history of natural sciences.

III

We have at our disposal the concept of „progress in science” which has little informative value provided that we refrain from attaching any assessment to the word „progress”. The search for the deeper sense of that concept may concern the priority to be given to either its first or its second component: is progress in science to be construed as the internal characteristic of a series of consecutively formulated scientific opinions or is science also a part or a product of progress? Or, speaking otherwise, are particular sciences independent of any external, more or less abstract social progress, while progress is being reflected in the consecutive achievements of these sciences, or is the state of each science the result of social progress at a given moment? Is it true that the development of science depends on progress or should one rather say that progress is reflected in the development of science?

It seems that there are two answers for two extreme models of sciences: for the model of “non-social” sciences, with mathematics coming closest to it, and for the model of “social” science, with history as its most characteristic exponent. At various distances from these two ideal models converge the specific natural and social science, and between them, merging some features of both, are the technical, agricultural and medical sciences.

It can be argued that the history of mathematics and theoretical physics is connected with social history and such is the underlying assumption of this article. However, it cannot be proved directly that the actual state of mathematics or theoretical physics, that a given theory, that the creation of a scientific system or its downfall, are linked with a given society or a given period of history. It is much easier to point at a specific period in the course of which a given scientific opinion could not emerge as a social fact than to indicate a period in which its emergence can be taken as historically determined. When dealing with such problems as the situation of scientists, the technical means used by theoreticians, the tasks laid down for science by philosophy or practical needs, we are discussing social factors of development a given science, but we are not concerned with science as the result of scientific investigation. In some natural sciences, and to an even higher degree in mathematics, such investigations cannot be translated in terms of social change.

Thus, in the model of “non-social” sciences there is no other progress than that expressed in the form of consecutive results of scientific en-

quiry. When I use the words "progress in physics" I have in mind the discovery of facts and the formulation of theories a field called "physics". It may be demanded from these theories to meet certain conditions, but they are, above all, the product of a series of theories formulated in the past; rarely and only in the case of great scientific revolutions when scientific theories confront each other as parts of conflicting philosophies, are they the result of general science methodology linked with the ruling social philosophy. The object and system of reference of natural sciences is nature which changes so slowly that all generations or researchers observe, more or less, the same reality.

The object and the system of reference of mathematics was — at its source — also an immutable reality, namely phenomena to which numerical concepts or concepts describing space can be applied. The changes in mathematics are the most independent from social change not because the object of mathematics is immutable reality, but because, in certain sense, this reality itself is the result of mathematical enquiry. Mathematics can shape existing reality as well as reality which can be supposed to exist, but there is no need to accept these assumptions in order to conclude that mathematics has its object. The reality of mathematics is immutable only in that sense that mathematical theories cannot evolve by themselves. They can however be replaced by other, together with their *a priori* theorems. And these changes also cannot be related directly to social change.

On the other hand, in history and, to a larger or smaller extent, in other social sciences it is very difficult to separate social change from scientific change for each state of scientific development reflects the intellectual image of society, while society, being the subject of inquiry and the system of reference of these sciences, is not immutable. For the theoretical model of "social" sciences the variability of enunciations and affirmations is nothing but a reflection of the variability of humanity.

The term "progress" assumes the existence of a certain system of reference. When saying "progress in history" I have nothing else in mind but a succession of societies with differing structures and features and, in particular, with differing ways of viewing past history. It is, therefore, very difficult to find progress in social sciences since the subject of inquiry and the system of reference are mutable.

Thus, although the relationships between scientific statements and societies in whose midst they are born and spread are the same in the case of an extreme model of both "non-social" and "social" science, the intensity of these relationships differs considerably. Metaphorically it can be said that the intensity on the line society S1 — society S2 and society S1 — historical science HS1 and society S2 — historical science HS2 is much higher than on the line HS1 — HS2. It is due to the fact that the necessary condition for the emergence of HS2 is the existence

of S2. The shape of the former statements of HS1 is of no direct bearing on HS2; it is relevant only when confronted with S1.

Social theory reflects on researchers of the following generations through the reality which surrounded it. A researcher analyses the statements about society by investigating society itself. And, as a rule, these statements represent in his view exclusively one of the changing forms of the evolving human intellect. Social theories are examined from the vantage point of their era and the reality which they reflected or reconstructed (even though the reality may have covered the whole period from the establishment of human society to the moment of investigation), and not from the point of view of their validity under universal conditions which, obviously, cannot include the entire social reality. That type of collecting statements of the past could be called objective cumulativity.

On the other hand, in a textbook on the history of mathematics the cumulation of statements formulated in the course of the development of that science follows another course. A mathematician or, more generally, a natural scientist, while reverting to past statements, does not compare their content with the object of inquiry which led to their formulation for — as a rule — he has no non-source based knowledge at his disposal which enables the historian to verify a statement with the reality. That is why a natural scientist analyses the internal structure of past statements comparing them with his own statements. He rejects those which are useless as research instruments or hinder his activity, when they cease to be a useful point of departure for further investigation, when he sees no point in making use of them, in formulating them in a more precise form or in totally negating their validity.

We are confronted with a peculiar division of previously formulated statements between useful ones, i.e. those enabling the researcher to continue his research within the framework of a given theory, and the useless ones, i.e. those contradicting the statements of the ruling theory. In the course of time, those branded as useless drop into oblivion. In this way the whole former contribution of a given science may be rejected together with the theories explaining such facts with which the new theories are unable to cope. However, what has not been rejected ceases to belong to the past. Such statements, considered topical and valid, acquire the status of legitimate elements of new research. Past contribution is, therefore, always present in the work of, say, a mathematician and if it is not repeated at every occasion it is so because the facts are too well known to himself and to his fellow scientists. Yesterday's great discovery accepted by the scientific community is no more than a research instrument serving the needs for new further reaching investigation. The only place where the representative of "non-social" sciences can collect scientific statements of his predecessors is his workshop. We may call such an approach cognitive cumulativity.

The object of technical sciences is the world created by men from matter supplied by nature⁴. On the one hand, it follows the rules which, at a given moment, are said to be governing nature and, on the other hand, it is closely connected with civilization. When observing the way in which the representative of technical sciences looks at the history of his own science we discover the presence of both objective and cognitive cumulativity. The representative of technical sciences has assimilated all statements and recipes recognized by his fellow natural scientists, however technology and for that matter forms of human self evaluation are related to a specific stage of social development and bear, above all, the mark of a testimony of that stage. In a similar way a philologist investigates dead languages which are useless today but served in the past as a means of communication.

Moving ahead in the same direction one may classify social sciences, technical sciences and natural sciences from the point of view of their distance from the ideal models of objective and cognitive cumulativity. One may find here, for instance, the criterion which distinguishes history from sociology. The latter which investigates mainly structures with, at best, a slow mutability, and which uses a certain number of primary concepts such as, for instance, the social group, approaches more than history the pole of cognitive cumulativity. This is all more comprehensible that the sociologist himself, recognizing the existence of biological determinants in society, brings his science closer to natural sciences. In the same sense a historian, using sociological science on the rules of behaviour of human society, carries history away from the model of science of objective cumulativity. Perhaps history of literature and history of arts, hitherto the farthest removed from the application of methods of natural sciences and from the perception of biological determinants in their material, are closer to that model.

IV

What is the importance of these considerations for the approach to the problem of, say, history of physics in a history textbook? It seems to me that when speaking about cognitive and objective cumulativity we are expressing ourselves, in the first place, on the way science develops from which a specific view concerning their past history emerges. It may be surmised that a history textbook will neglect the presentation of the de-

⁴ Comp. E. Olszewski, *O technice materialnej i naukach technicznych* (On Material Technology and Technical Sciences) [in] a collective work published under the title: *Problemy epistemologii pragmatycznej* (Problems of Pragmatic Epistemology), Wrocław, 1972, pp. 167 - 168, p. 170.

velopment of specific sciences connected with cognitive cumulativity. The history of physics would, thus, be presented not against the background of social development which influences that history without determining its course, but as something accompanying that development. Each stage of development of physics would, therefore, appear as the intellectual product of the society — which could eventually be true with some smaller or greater deviations when applied to social sciences. Thus, the development of mathematics and natural sciences would acquire in contradiction to their very nature the features of continuity, evolution, “small improvements” imitating the evolutionary process of society. And the era represented by the historian will be granted the privilege of last resort in the field of natural research.

In the same way history of social sciences would also be subjected to the study of the historical era under consideration. It seems, however, that the historian has in this case no other possibility of looking at the past. A historian living in the 20th century and studying history written in the 17th century must relate it to his own reconstruction of the society of the 17th century. He has no possibility of renouncing his non-source based knowledge, be it of current or scientific origin⁵. To ask for the removal of objective cumulativity would amount to a demand that the historian be limited to empirical study only and be confined to an illusory resurrection of a document drafted in a language of concepts and ideas of its time and turning into dead letter when separated from the reality which presided over its birth.

On the other hand, there is way out for the historian of mathematics and natural sciences, a way consisting in avoiding such a presentation of the past, which is a process of cumulation approaching cognitive cumulativity, as if we were confronted with objective cumulativity, which characterizes the series of judgments societies offer about themselves and about their past. At the same time, there can be no full vision of the development of a science if the historian indulges in a selection and presentation of only such statements which suit the ruling theory of his time. In other words, it seems that a complex view of the history of physics must be a synthesis of the point of view of the historian, who will relate that history to the series of social structures which surrounded the birth and spreading of consecutive systems of physical science, with that of the physical scientist who is equipped to analyse these systems and their internal working and to compare them with his own knowledge. In this way it may be possible to achieve a dialectical synthesis of two contradictory stands, one represented by the mechanical linking of science history with social history — an approach to which the historian may be

⁵ On such a division see J. Topolski, *Metodologia historii* (Methodology of History), Warszawa, 1968, pp. 51-57.

inclined — and the other marked by a tendency to separate science history from social history and to subordinate the former to one's own theory — an approach to which the natural scientists may be prone. It is not difficult to observe that this is a model of approach which the historian of natural sciences applies as a rule, or at least ought to apply.

The shortcomings which can be noticed in the presentation of science history textbooks have their origin, in the first place, in the failure to adopt a somewhat different view when treating science history as compared with the treatment of social history. The difference between the methods of a science historian and of a "general" historian are differences of methodology.

One may therefore reopen the question as to who, in fact, the historian is? Since science history and histories of specific sciences do not constitute, together with other branches of history, a uniform entity, history cannot be treated as an arithmetical sum of all historical sciences. Consequently, the historian "without a qualifier" ought to play the role of a scientist who offers a synthesis of the conclusions presented by the historians dealing in particular fields. History must therefore be recognized as a synthetic science, offering a general view on the basis of the results achieved in the investigation of all branches of history, while at the same time being an indispensable tool in the scientific work carried out by the representatives of the latter.