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Some Thoughts on Outlines of Science Historiography in Natural History

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Abstract

"Outline of science historiography in natural history" is a new approach to scientific history compilation proposed forward by Professor Huajie Liu, a professor of natural history and philosophy of physics at Peking University, and also a famous naturalist in China. He systematically introduced the knowledge of Western natural history into China and initiated the study of modern natural history in China. He mainly focuses on the contents of natural history that have been neglected in the previous research of the history of science, that is, attempting to construct a new outline of scientific history compilation from the perspective of natural history. This outline is proposed mainly in response to the phenomenon of taking mathematical science as a reference point for all research in the history of science. This paper discusses the main content of the research program in detail and continues the relevant thinking.

Keywords

Natural History, Mathematical Science, Historiography of Science, Multiple Views of Science

1. Introduction

With the success of modern science and technology in real life, most of the history of science has been written into a corresponding history of science composed of mathematical sciences. However, although the mainstream science today is the mathematical science represented by physics, there have been many non-mathematical forms of knowledge that have made important contributions to the development of science in history, such as natural history. "If we look at the vast majority of the history of science, we will find that the vast majority of its contents are of the kind of modern mathematical science, as well as the 'pre-sciences' related to it in the context of its development. But the contents of

natural history, which have been more and more despised with the development of modern science, although they once occupied a far more important and glorious position in history, are now lightly brushed aside or simply ignored." as Bing Liu, a famous scholar of the history of science at the University of Tsinghua once said (Liu, 2011a). This traditional approach to the historiography of science will make us miss many important aspects of the development of science and fail to fully understand the history of science.

As far as the history of occurrence is concerned, this history of science composed only of physical science is a one-sided and single history of science. This proves the adage that "history is written by the victors". However, history is often pluralistic and multifaceted, referring not only to the losers corresponding to the winners, but also to criteria other than "success or failure". In this regard, Huaihong He, Professor of Philosophy, Peking University, put forward such a proposition, i.e. "history is not afraid of prejudice, but it is afraid of being too single" (He, 2022). The singleness referred to here is the singleness of the standard that is incompatible with the pluralism of the objective world. In China, the most successful representative of diverse perspectives on historical narratives is Sima Qian's *Records of the Grand Historian* that has become one of the most talented and original works in the official history of China, and is also the most inclusive of all the pioneering work. The same question applies to the science historiography.

Now let's go back to the history of science. There have always been two mainstream knowledge traditions in natural science: one is the tradition of mathematical science, and the other is the tradition of natural history. Historically, the natural history tradition is much older than that of the mathematical and physical sciences, and the natural history tradition has also made important contributions to the development of science, even mathematical and physical sciences were originally developed from natural history. In other words, the tradition of natural history had made an important contribution to the development of natural science in history, but with the development and growth of mathematics and physics science, natural history also had gradually lost its influence for a period of time in the history of the study of science. But nowadays natural history has regained its vitality in such areas as philosophy of science and history of science. Following this trend, Professor Huajie Liu proposed a claim of "outline of science historiography in natural history" to solve the problems arising from the compilation of history of natural science.

Natural history, in its literal sense, is the knowledge of "identifying many things" (Liu & Shi, 2014). Natural history is a discipline that describes natural knowledge (including the species, distribution and ecology of animals, plants and minerals). From the perspective of knowledge theory, natural history refers to "the classification and macroscopic description of natural things, as well as the study of the internal relations of systems, which is opposed to reductionist science as mathematical and physical science. It includes both ideas and practical tech-

nology" (Liu, 2014). Natural history, an ancient knowledge about human existence, comes from the process of human interaction with nature. In the process of dealing with nature, human beings observe and understand nature for the need of survival, thus accumulating rich knowledge of natural history and forming rich culture of natural history. Many subjects in the natural sciences were born out of the naturalistic culture, such as biology or the life sciences, which were entirely naturalistic in their early days. Others such as geography, geology, mineralogy, entomology and, more recently, ecology and conservation biology have also emerged from natural history. However, these disciplines in the early days had more components of natural history, and later, with the development of the discipline, mathematical components gradually increased, fortunately, they did not lose the tradition of natural history in the end.

Unlike natural history, which has a long history, the tradition of mathematical science has a history of only 300 years. Although in theory this intellectual tradition goes back to ancient times when created by Euclidean geometry and the tradition of Pythagorean and Platonic in ancient Greece, the real foundation of this scientific tradition began with Galileo and Newton. Galileo was the first to advocate the method of experiment and mathematics, and accordingly put forward the concrete steps of natural mathematicization which modern physical science is built on. Hence, Galileo also became the "father of modern physics". The establishment of Newton's classical mechanics system is a perfect demonstration for the establishment of modern mathematical science. Modern mathematical science, represented by physics, has gradually gained the right to speak in the field of natural knowledge, and has occupied the dominant position in the traditional historiography of science history. Therefore, since modern times, the history of science has been based on the development history of physics and related disciplines. The biological philosopher Ernst Mayer, for example, once complained that the history of science for the last few hundred years has been the history of physics. To some extent, the history of science can be seen as the history of the development of physics, chemistry and other related disciplines. Through the establishment of Newton's mechanics system, modern science has also completed the transformation from the tradition of natural history to the tradition of mathematical science.

2. The Defects of Science Historiography with Mathematical Science

The most important feature of this kind of mathematical science is: first, to obtain all the important data about nature through physical experiments; then, through mathematical processing, these experimental data are logical and systematic. Ultimately, knowledge about nature is expressed in the form of a combination of mathematics and physics (experimental sciences). Since then, nature has completed its mathematicization and is no longer a vivid and complete object. This mathematical view of nature allows people to place nature in a static,

universal, eternal space-time. And gradually mathematics and axiomatization became the most authoritative forms of scientific knowledge about nature. Knowledge without these forms is considered immature, unsystematic, and even unscientific. Especially after the development of logical positivism, this kind of mathematical science has become the standard of judging whether it is science or not and has become an absolute authority. All knowledge different from physical chemistry and other natural sciences, such as tacit knowledge, natural history, and even biology, is excluded from the scientific horizon. Therefore, the related content of natural history has been gradually abandoned in the corner of the history of science by historians of science. However, this highly artificial nature is not nature in the true sense and the history written by this view of the history of science is not the history of science in the true sense. This will only adversely affect the pluralism of science and culture.

Unlike natural history, which takes personal observation as the main method and macroscopic description as the main form of knowledge, physical science is highly integrated with mathematical logic from the beginning, and far away from real nature and people's practice. However, due to the simplicity, certainty and rigor brought by physical science, people get a simple and easy power when using the results of it to transform nature, so physical science is also called "power science". Because of these advantages, physical science quickly occupied the core of contemporary knowledge and established its own discourse dominance in the field of knowledge especially in the philosophy of science. At the same time the history of science led by this kind of science also shows some obvious characteristics consistent with physical science to form its own unique set of world view, values and scientific view.

2.1. A Single, Exclusive View of Science

Because of the highly mathematical and logical characteristics of physical science, the knowledge has obtained the universal knowledge form. Such knowledge is non-empirical, not limited by time and space, and has universal truth. At the same time, mathematical and logical knowledge also has a high degree of self-consistency and self-justification, so that such a knowledge outline seems to always be in the right, almost become the truth. Every truth, as we know, however, must have a kind of exclusivity.

In this case, personal knowledge and tacit knowledge acquired through the personal life practice of individuals, such as natural history, will not only become a scientific knowledge in the strict sense, but even be regarded as "pseudoscience" in extreme cases. The mainstream of science has gradually developed into the form of physical science, and the view of science has gradually entered a single view of science. In turn, all that is scientific gradually becomes the only correct and unquestionable truth. What is true can be improved through accumulation, and what is improved is good. Scientism developed on this basis and successfully dominated many fields of study which is a sign of danger in knowledge field.

2.2. The Combination of Science and Capital - Utilitarian Values

In modern times, science and technology have been successfully combined with capital, and since then science has become a means to realize capital appreciation and operation. In the end, he deviated from the original intention of seeking knowledge and exploring nature, and took the conquest of nature and the improvement of material life as his ultimate goal and pursuit. In the process of pursuing scientific development, the environmental price paid by human beings is ignored. After hundreds of years of rapid development brought about by science and technology, human beings will face a riddled ecological environment of the earth. Humans are more like gophers who just take and dig.

2.3. Form an Isolated, One-Sided, Static World View

Fundamentally, all these problems stem from the way of thinking of mathematical science, which regards nature as an objective world independent of human existence and merely as an extension of matter. Under such a premise, nature becomes the field of human scruple, and from now on has nothing to do with human life and death, often referred to as the mechanistic worldview. Under this worldview, nature loses its wholeness and organic nature, becomes an isolated, static existence, gives way to human self-centeredness, and inevitably leads to death.

3. Historiography in Natural History

It is under such a background that Professor Huajie Liu based on his years of experience in natural history research and understanding of natural history, pointed out that: "Now the academic development has reached the suitable time to put forward the fundamentals of history of natural history, the scope of application of this outline will not be limited to the narrow natural history science, should cover all scientific categories" (Liu, 2011b). Professor Liu mentioned the specific contents of historiography in natural history in several articles, included "Three Men's Talk on the Historiography in Natural History", "On the Fundamentals of Bowuxue[1]", and "Re-Talk on the Outline of Historiography in Natural History".

Firstly, knowledge in the form of collective beliefs, as a basic survival requirement, is consistent with the living habits and social order of the time and place. The history of science or the history of knowledge has always been a part of the cultural history of human society, and the new history of science will be as much as possible wary of the Whig view of history. The rationality and value of natural history, which includes empirical knowledge and practical skills, are mainly reflected in the fact that it meets the sustainable adaptability needs of human beings or their parts to nature, and the correlation and distance between them and the modern scientific and technological system are secondary. The science and

[1]"Bowuxue" is professor Huajie Liu's definition, which corresponds to the term "natural history" in Western academia.

technology historiography program should not be overly influenced by today's textbooks, nor should it take too much account of the achievements of the mathematical sciences in the last few hundred years.

Secondly, it highlights the concept of museum and feelings of museum, and clearly describes the value care of the history compilation process, such as giving full consideration to the sustainable development of mankind, the lasting symbiosis between man and nature, and sympathizing with the non-anthropocentric theory. This amounts to a statement of a certain ecological principle, that ecology, which has become a prominent science, originated in natural history and is now in danger of forgetting its roots.

In the work of science and technology historiography, the importance of various kinds of knowledge should be judged according to the standard of sustainable development of man-land system. If the destructive production and use of knowledge cannot be slowed down, the dangers to people and the environment will grow. At present, in the view of the vast majority of intellectuals, knowledge is neutral or unconditionally positive, and the social system does everything possible to reward the production of all kinds of knowledge. This does not bode well. Criticism of knowledge, like criticism of power, is necessary for the normal development of society. At present, the vigilance and criticism of power have attracted wide attention, but the vigilance and criticism of knowledge have just begun.

Thirdly, attach importance to anthropological perspective and pay attention to folk practical knowledge. In history, the transmission of natural history knowledge is varied, such as oral knowledge, individual knowledge, religious customs, etc., most of which are unfamiliar and unaccustomed to modern people. We cannot simply say that natural history is a proper subset of science or an immature stage of science. For example, "Yinyang", "Wuxing" and "Zhongyi" theories were all important knowledge systems in ancient China and cannot be dismissed as superstition or pseudoscience by today's standards. The work of historiography cannot be entirely dependent on written texts. Fieldwork will be an important part of historiography, and anthropological and sociological methods will be very important.

From the above, it can be seen that the program of historiography in natural history is to put forward solutions to the problems existing in the historiography of science under the tradition of mathematical science, such as one-side and utilitarian values, scientism, single scientific view and cultural view from the root and specifically indicate their corresponding positions on these issues.

First of all, in view of the situation that mathematical science monopolizes the history of science, the proposed program of history compilation of natural history means the general purpose of restoring the proper position of natural history knowledge in the history of science. The restoration of natural history knowledge is not only related to the liberation of the thought of compiling the history of science and the broadening of the vision, but also related to the overall

gist of human survival and the sustainable development of the relationship between man and nature because of the characteristics of natural history itself. In contrast, the distance from modern science and the current achievements seem not very urgent and important, and the victory and success of modern science at the cost of environmental destruction seem short-sighted and ridiculous. Then, the values and standards of mainstream science that have emerged from this fall apart. The problems of scientism mainly arise from people's value judgment on the content of the history of science, so the program of history compilation in natural history is essentially broken with scientism. With more critical and rational reflection on the development of science, it is not so easy to return to the traditional Whig's view of the history of science. In this respect, the outline of historiography of natural history is anti-Whig', and fundamentally anti-Whig' history.

Second, for the disenchantment of science—the multi-scientific view should adopt a variety of compilation methods. Compared with agricultural civilization, the victory of industrial civilization was huge, and correspondingly the modern scientific system that supported industrial civilization also achieved the supreme voice, even to the point that all cultures should be measured by whether they are scientific or not. The program of naturalistic historiography attempts to return the history of science to its normal position as part of the cultural history of human society. Not only does it recognize the diversity of society and culture, but also the diversity of culture of science. There are not only scientific cultures of mathematical sciences, but also other types of scientific cultures.

It is just that in the development of science, these contents that are not so important to mainstream science are artificially shielded. Moreover, because of the diversity of science and culture, the methods adopted in the process of compiling its history should also be in line with the position. For example, relative to the characteristics of natural history knowledge, "Historiography cannot rely entirely on written texts, fieldwork will be an important part of historiography, and anthropological and sociological methods will be of great importance. Secondary work must be closely combined with primary work, and it is hard to imagine that anyone who does not love nature can be a good historian of natural history. The study of historiography is similar to the study of empirical natural science, in this sense, the program of historiography in natural history is anti-scientism but also scientific." (Liu, 2014: p. 51). It contains the reflection and criticism of the centralism of science and anthropocentrism.

In addition, for the characteristics that mathematical science is far away from People's Daily life and is too professional, we should advocate the personal, concrete and sentimental attachment of natural history knowledge. While the mainstream mathematical science overemphasizes experimental data and mathematical logic, it not only deviates from the real nature, but also excludes man from nature, and nature becomes a lifeless machine and the object of experimentation, thus man stands in opposition to nature. The history compilation of natural history starts from both theoretical and practical levels, guides people to carry out

the practice of natural history, reconstructs the relationship between man and nature through the way of natural history, clearly describes the value concern of the history compilation process in the way of "natural history concept, natural history feelings", fully considers the sustainable development of human beings, the lasting symbiosis between man and nature, sympathizes with the non-anthropocentric theory.

Furthermore, Professor Huajie Liu believes that today's science and civilization are "destructivity", and long-term life under such a civilization will seriously harm human's perception of natural changes and response to natural disasters. Natural history can just narrow the distance between man and nature with its own practical and intimate nature, and restore human's "perception".

4. Some Problems about the Outline of Science Historiography in Natural History

To put forward and clarify a new position and perspective of historiography is of great significance to the study of the history of science. Because most researchers usually only work within the framework of the existing research, or follow the path of the existing research. But coming up with a new program requires a lot of effort and a lot of risk. At present the greatest risk to the outline of science historiography of natural history is that there is no real history of science written under this fundamental. That is to say, different from the previous mature scientific historiography programs, whether it is positivism, internal history, external history or SSK, the program of historiography of natural history is only a theoretical and idealized program of history compilation. There is still a long way to go to transform a simple program of historiography into an actual work of the history of science.

Although all the scientific historiography programs mentioned above are of the same dimension and take mathematical science as the research object, the natural history historiography program has a broader vision than the feminist and post-colonial approaches in terms of the breadth of science. Perhaps because of the local nature of natural history, it is not possible to write a unified history of science and technology like the mainstream history of science, and the final history of science under the program of natural history can only be presented in the form of local knowledge, ethnobotany, and ethnocultural history.

On the other hand, although we now advocate the restoration of the tradition of natural history and the priority of the dissemination of natural history knowledge, this does not mean that natural history is good or without any defects. "Natural history is also diverse, and there is quite a lot of dross" (Liu, 2014: p. 112). For example, in the course of the development of western natural history, although they had limited power to conquer nature, some naturalists slaughtered and felled animals and plants destructively in the process of natural history investigation. Even the differences from the mathematical sciences are not complete. In other words, natural history also uses theories and does what it does to

idealize nature, but it is less able to use mathematical methods (which does not mean that it does not want to). And natural history has a special love of the order of nature, Darwin's evolution is the best proof. It is just that natural history does not restore nature as deeply and successfully as mathematical science.

Therefore, in this sense, "natural history and mathematical science are not monolithic, and they have different paths within them, not all bad and all good" (Liu, 2014: p. 112). In both the natural history tradition and the mathematical science tradition, there is a tendency to make people forget the world of life, and there is a tendency to make people close to the world of life. What the program of history compilation of natural history brings to people is only to return to the part of natural history that is friendly to life and conducive to improving the value and emotion of life on the basis of the overdeveloped mathematical science.

There are other problems, such as the knowledge and culture of natural history in all parts of the world, but whether there is a natural history in all parts of the world is still a question worth discussing. This involves the most basic taxonomic problem in natural history. Foucault once raised the strange problem of animal classification in Chinese natural history, while the West has indeed established a more recognized classification system of animals and plants in natural history. And what weight does the new natural history place on the combination of mathematical science and natural history? And so on.

5. Conclusion

This article mainly discusses the historiography in the history of science. This paper makes a comprehensive comparative analysis of the advantages and disadvantages of the traditional positivism historiography program and that of natural history program. This paper summarizes and generalizes the problems of the unitary and absoluteness compilation of the history of science under the traditional scientism concept of history compilation. I criticized the unitary and absolutist compilation of the history of science, and pointed out that more methods of historiography should be integrated, especially those of natural history. More vivid, concrete and vivid humanistic feelings should be introduced into the compilation of the history of science. As it happens, the program of scientific historiography in natural history can well supplement the deficiency of the traditional scientific historiography. Especially for the problems of scientism, single scientific view and cultural view, the program of history compilation of natural history puts forward the solution from the root, which enriches the pluralistic composition and dynamic development of science. Recognizing the diversity of scientific culture and knowledge is conducive to the healthy and orderly development of science. Diversity is not in conflict with science. The demarcation standard of science changes with the changes of The Times, and it is no longer a single, universal standard that can be described. It will also promote an understanding and tolerance of the diversity of social and human cultures, rejecting any form of

centralism. The essence of science is to respect objective facts and objective laws, and the history of science should reflect such a spirit. And the common fact and the only law about this blue planet we live in is that we live in a world of abundance and diversity.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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