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The Concept of "Bacteria" During the Late Qing Dynasty

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The ancient Chinese people had developed, on the relationship between the human body, disease and the environment, a variety of explanatory models. "From the disease caused by insects", the theoretical resources built one of the concepts of disease of the Chinese people in the Late Qing Dynasty. From the middle of the nineteenth century, the pathogenicity of bacteria was not only born in the West, but also translated into China through various channels. When China's "insects" and "mushroom" encountered the Western bacterial pathogenicity, "insects" and "mushroom" have become the concept of access to the knowledge base of bacteria. Xi Jun (細菌) is one of the many new nouns born in the late Qing Dynasty. China often uses "bi ta li ya" (壁他利亞) and other transliteration, such as microbial, mold and other names for translation. Behind the translated name, the complex and diverse knowledge of the people at that time are reflected, showing a reasonable imagination of flying insects in the wind.

Keywords: insects, mushroom, bacteria

Introduction

Since the birth of Western bacterial pathogenicity in the late nineteenth century, the theory gradually challenged the system of the Western traditional medicine and traditional Chinese medicine. Now after nearly 150 years of development, mankind has entered the era of bacteriology. So how did the Western Bacteriological Theory spread in modern China? It is not easy to answer this question. In recent years, medical history scholars have started a lot of useful explorations around the issue.

To find the source of modern health thought, Joseph Needham, Gwei-Djen Lu and Nathan Sivin (2004) once researched the concept of "health", "insect", "wind" and so on, but they did not lead to the problem of the formation of the late Qing theory of bacteria. Starting from a kind of disease, Bridie J. Andrews (1997) had taken tuberculosis as the main clue to explore the different sectors of Chinese society on the different theories of bacterial knowledge. Then, Pi Guoli (2012) discussed the "Qi" and "bacteria" around the modern Chinese and Western knowledge in the "fever" discussion.

However, how could the Chinese history of bacteria be known to be appropriate? What is clear knowledge about the past life of the concept of "bacteria"? How can people use the concepts of insects and mushroom to understand the concept of bacteria in the late Qing Dynasty?

At present, the academic circles have not yet studied the above questions deeply. Based on this, this article will proceed studying the issue from a long time ago, with a discussion of traditional Chinese medicine in the

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disease caused by insects or mushroom; it will then try to understand the “bacteria” concept in the late Qing Dynasty to generate a complex historical plot.

Insects as Medicine and Witchcraft

The understanding by the ancients of the insects, when there was a split in different historical periods of knowledge and culture, can be roughly divided into natural science insects, witchcraft, and a few species of pathogens.

As early as the “Shan Hai Jing”（山海经）there are many references to insects. What is more, in “Shuowen Jiezi” (说文解字), “insect” and “insect” have a different sound and meaning, “insect”, specifically refers to a snake, that is viper. During the Qing Dynasty, in the “Kangxi Dictionary” there is a conclusion, claiming that “insects are divided into three kinds, three different pronunciations, and three different meanings.” This indicates that the insects are the important names of the mortal beings, and this understanding also constitutes the ancient Chinese natural history of insects which can exist on text basis.

During the Ming and Qing dynasties, the work was represented by the “compendium of materia medica” (本草纲目), the classification of insects becoming more systematic, and the relationship between worms and diseases more clear. The book contained 1,892 kinds of drugs, out of which insects occupy 106 species, known as the “insects”, while a general description of the details, states as follows: “虫乃生物之微者，其类甚繁，故字从三虫，会意。……于是集小虫之有功有害者，为虫部，凡一百零六种，分为三类，曰卵生、曰化生、曰湿生。” (Insects are biological micro-who, of very numerous kind, so claims the word from the three insects. The insects are active and harmful, all the one hundred and six of them, divided into three categories: oviparous type, metaplasia, and humidogene). Li Shizhen thinks two characteristics: “micro” and “numerous”. Compared with the previous books, Li proposed a classification of insects in three categories, which is completely different from the previous method, meaning that it is no longer done only according to the body of insects, but in accordance with the way of breeding. The re-classification, is done as “harming” of the other. This kind of classification influenced Bernard. E. Read (1936), who tried to translate the compendium of materia medica in the late Qing dynasty.

The above is the natural significance of the ancient insects, at the same time, insects or worms also have an association with the body of the ancients, becoming one of the important arguments for the cause of disease. According to the ancients, there is an often-used-greeting, “Hope that you are well” (别来无恙), which is still widely used. The so-called unharmed at first not only refers to the disease, but to the insects. In other words, in the ancient times, the ancients meant, by “unharmed” (无恙), to convey the care of the person.

If the naked eye is very early way to see the ancient insects as an important basis for the interpretation of the disease, then the entity and the concept of insects is used in the ancient religion, medicine, witchcraft and other areas to explain the important theoretical resources of the disease.

In addition, there are a large number of insects for the radicals, and the disease associated with the Chinese characters, such as insects “疒”, Duan Yucai (段玉裁) (2013) annotated, “疒 that pain word”. This is obviously a parasitic disease, and there is a lot of focus on parasitic diseases in ancient times; for instance, Buddhism has the word “80,000 households” (八万户虫), and Taoism holds “three bodies of nine insects” theory（三尸九虫）.

The “three bodies of nine insects” originated from Taoist medicine, and held the belief that the human body was associated with the three bodies of nine insects. Nine insects have intergenerational transmission, except for the stomach worm, the return insect, and the meat insect; the remaining six species of worms have been bred in the human body for six times, and born for six generations, each generation of insects causing a variety of symptoms.

In fact, this view of Taoist medicine also influenced the ancient Chinese medicine theory. The Cao Yuanfang (曹元方) (2008) believed that the body of dead insects and evils is the root cause of disease. Dead insects and dead bodies have become one of the causal factors. In terms of the disease, gas and insects can be transformed into each other. It is also said that the ancients believed that rauchi “Lao Qi” (痨气) could be turned into worms, not only to avoid the worm, but also to prevent the worm from gasification.

Of course, all of these are naturally occurring insect diseases, and there are still a lot of records of the “gu” (蛊) in ancient times. It was first seen in “zhouyi” (周易) gu hexagrams (蛊卦). Combined with the font point of view, the body’s abdomen is like a vessel, from the outside into the poisonous insects. In ancient times, deliberate planting of “gu” was forbidden by the law.

It is worth noting that the “Qing Bai Lei Chao” (清稗类钞) in the late Qing Dynasty had a detailed description of the “southern implant gu” (南方行蛊). According to the purpose of this kind of practice, it can be divided into two categories: first, to keep intercourse for men and women, and second, to murder the business, for plans to kill one’s life. The travelling man often uses licorice to verify whether there is any insanity. In this sense, the poison of gu, a worm, used in witchcraft, is also one of the reasons for the interpretation of the cause of the ancients, and its mysterious color shapes the idea that the ancient people do not enter the village, where people can implant gu.

Actually, besides the insects directly impacted people with diseases caused by insects, the combination of insect and wind and qi (气) also is the reason..

Today, the common simplified Chinese word “wind” (风) hindered us to think about the relationship between ancient insects and the wind. In the traditional Chinese word “wind” (風), the middle is actually a worm part. Just look at the shape of “wind” (風): the worm is in the wind, as it seems to convey the wind of the eight sides, the information of the worm in the middle.

During the late Qing Dynasty, in Gong Zizhen (龚自珍)’s “release wind” articles (《释风》篇), it was believed that the characteristics of the wind were fluctuating and inscrutable. As for the relationship among the wind, the worm and the sick and the dead, he also continued the Taoist argument, “无形么虫万亿，昼夜啮人肤，肤觉者亿之一耳，是故有老死病。” (tens of thousands of worms, gnawing at the human skin day and night, so people die). There is a similarity to the interpretation of the relationship between this insect and the relationship between life and death and the late 19th century bacterial disease, but earlier than the bacterial disease was said to occur. So how did the missionary in China explain “wind” and “insect”?

> 虫, commonly read Chung. A general term for insects, worms, reptiles, including Testudines; lizard kind; Serpents and frog kind. There is not in European phrase any word that corresponds to the Chinese Chung, from which circumstance, the word insect in the following definitions, must not be understood strictly in many cases; for with the exception of birds, quadrupeds, and fish that swim, almost every living creature is called Chung. (p. 243)

According to this dictionary, no one of the European words to express the meaning of the Chinese context of insects, should not be the exact meaning of the corresponding insects, because almost all living creatures (living creature) are called Insect (chung).

In 1849, Chinese Respository published an article on the “wind” (風) word of the long text “Illustrations of the Word Fung”. The author Philo noted that the word “wind” (風) has a long history and rich meanings in Chinese culture. At the same time, Chinese etymologists often regard “風” and “蟲” as a whole, both referring to “all” and “insects”, but also to the naked eye “Minimal creature” (the smallest of living creatures). However, Philo also believed that “wind” (風) is a kind of spirit of God moved upon the face of the waters, which contains the Chinese and Western cultural exchanges and the collision of the tension still needs more evidence to sort out.

Bacillus, Microbes and Bacteria

The most important contribution of Western medicine in the nineteenth century was the establishment of bacteriology. If in the eighteenth-century, pathological anatomy set to find the cause of the disease and the internal organs through the relationship between pathological changes, then the nineteenth century used the bacterial theory to find the external causes of human disease.

In this period, Louis Pasteur (1822-1895) in France and Robert Koch (1843-1910) in Germany were representative figures in the field of bacterial cultivating and researching. In fact, many of the basic principles and techniques of bacteriological research are laid by Koch, whose main merit is a breakthrough in the means and methods of bacteriological research. Koch also isolated and identified many bacteria, such as Salmonella typhi, Mycobacterium tuberculosis, Vibrio cholera, leprosy bacillus and so on. However, due to the promotion of tuberculin that has not been completed in the experiment, many people have sacrificed innocence, and the experiment has also proved that tuberculin has no therapeutic value.

In the late nineteenth century, Chinese people had almost no concept of “bacteria”, for the reason that “Xi Jun” (细菌) on the translation of bacteria appeared late. Let us take “Shun Pao” (申报) newspaper as an example, the earliest appearance of the “bacteria” concept is in 1881, but there are no references to the microscopic visible bacteria, whose meaning is mushroom. An 1882 article entitled “poison bacteria harm”, reports probably about a custom in the seventy peaks, the Taihu Lake, Jiangsu Province, every time in the summer and autumn when the people went into the mountains to pick up “Jun” (菌) for sale; the price is very cheap, and its taste is very good. “Shun Pao” (申报) used the “insect” rather than “bacteria” concept, which itself is used in traditional Chinese culture, and “insect” related to the ideological resources to understand the emergence of bacteria.

According to the “Compendium of Materia Medica” (本草纲目), “Jun” (菌) also refers to mushroom. The ancients believed that the toxicity of “Jun” (菌) was related to the seasons and poisonous insects, “菌冬春无毒，夏秋有毒，有蛇虫从下过也” (bacteria in winter and spring is not poisonous, while in summer and autumn it is poisonous, as there are snakes and insects passed below). In terms of meaning, “Jun” (菌)’s division into toxic and non-toxic is becoming an important ideological resource to help us understand the bacteria as divided into toxic and non-toxic.

On the occasion of the initial establishment of the Western bacteriological theory, some translations about “bacterial pathogenesis” also appeared in China. In 1891, there was an article entitled “Koch’s Fluid” published

in the China Medical Missionary Journal, and the author H.W. Boone (1891) gave a detailed introduction to the famous experiments of Koch's research on Mycobacterium tuberculosis.

> It seems that Koch was guided to his discovery by observing the action of tubercle bacilli, living or dead, on tuberculous and non-tuberculous guines-pigs. In the healthy animal an inoculation of the pure cultivation gives rise, after a period of incubation varying from ten to fourteen days, to a hard nodule, which soon breaks down into an ulcer and persists until the animal dies. When, however, a guines-pig already tuberculation is thus inoculated, so nodule forms, but the superficial tissue at the place of inoculation becomes necrosed and falls off. Injections of a quite dilute glycerin infusion of a pure cultivation cause the animal’s condition to improve. Evidently, having got thus far in his observations, Koch was unable to overlook the obvious suggestion that even dead bacilli, or at least a solution of some of their constituents or products, contained something that might be made available as a drug and produce the same effect.… At all events, we are glad that the nature of the remedy has now been made known. The question of its curative action is still far from being settled. (pp. 28-29)

This suggests that treatment based on bacterial pathogenesis is not yet recognized at the time of the West, even though Koch is no exception. The “China Medical Missionary Journal” (博医会报) may only be a “medical news” introduced to the missionary counterparts in China; in fact, there is more on the introduction of surgical anesthesia measures, such as the introduction of cocaine as an anesthetic in 1890, David C. Gray, M.B., C.M. (1893) once explored the harm to chloroform in 1893, which also indicates that the bacterial pathogenicity is said to be immature and novel in 1890 written by Wm.W. Shrubshall, L.R.C.S. & P.Ed. (1890). This kind of “name is not true”, which shows that people can not directly use the “bacteriology” to understand this spectacle, as at this time “bacteriology” in China is basically in the “no” state.

Thus, among “microbes”, “insects” and “bacteria”, is there any kind of understanding of the relationship between bacteria or translation, or in the form, is there the situation of transliteration? Or in the context, is there an understanding of the path of bacteria during the late Qing Dynasty?

This seems to be corroborated in the article “The pathogenesis of micro-insects”, which first argues that bacteria are associated with people, “凡有生之地，即有壁他利亚在焉” (Where is the land of life, that is Bi Ta Li Ya). It is clear that the “ Bi Ta Li Ya” (壁他利亚) is a transliteration of “bacteria” and means “evil microbes”; it seems that it can be understood as the insects of bacteria. However, this kind of transliteration during the late Qing Dynasty is not uncommon.

In 1878, Li Fengbao (李凤苞) (1985) served as a Chinese ambassador in Germany during the visit. He went to the “迈克罗士谷比施阿夸林” (Mai ke Luo Shi Gu bi Shi A Qua Lin, microscope aquarium) to visit, the hospital set seven microscope. Here Li uses “microscope” to translate “迈克罗士谷比” (Mai ke Luo Shi Gu Bi). Actually, for such a complex issue, we can at least find basis in the “English and Chinese Dictionary” for analysis (see Table 1).

Table 1

Chinese Translation of “Bacteria”, “Bacillus” and “Microorganism” in Bilingual Dictionaries at the Beginning of the 20th Century

Year	Translated term or name	Information source
Bacteria		
1908	bacteria, 黴菌, 微生物	Yen, Wei-Ching Williams, An English and Chinese Standard Dictionary, Shanghai: Commerial Press,1908, p. 146.
1913	bacillus 杆稵, miao; bacteria, 稵, miao, 细菌类	MacGillivray, Donald, A Mandarin-Romanized Dictionary of Chinese, Shanghai: The Presbyterian Mission Press, 1918, p. 7.
1916	Bacteria,稵, miao 微生物, 黴菌	Hemeling, Karl Ernst Georg, English-Chinese Dictionary of the Standrd Chinese Spoken Language (官話) and Handbook for Translators, Shanghai: Statistical Department of the Inspectorate General of Customs, 1916, p. 93.
Bacillus		
1908	Bacillus, a rod-shaped bacteria found in certain diseases or diseased tissues, 杆状黴菌	Yen, Wei-Ching Williams, An English and Chinese Standard Dictionary, Shanghai: Commerial Press,1908, p. 144.
1911	Bacillus, 杆形裂殖菌, 杆稵, 细菌类	Wilhelm, Richard, Deutsch-Englisch-Chinesisches Fachwörterbuch, Tsingtau: Deutsch-Chinesischen Hochschule, 1911, p. 36.
1913	bacillus 杆稵, miao; bacteria, 稵, miao, 细菌类	MacGillivray, Donald, A Mandarin-Romanized Dictionary of Chinese, Shanghai: The Presbyterian Mission Press, 1918, p. 7.
1916	Bacillus, 竹节虫, 杆菌, 杆稵	Hemeling, Karl Ernst Georg, English-Chinese Dictionary of the Standrd Chinese Spoken Language (官話) and Handbook for Translators, Shanghai: Statistical Department of the Inspectorate General of Customs, 1916, p. 91.
Microbe		
1908	Microbe, a microscopic organism sometimes found associated with certain diseases, 微生虫, 微生物, 黴菌, 稵	Yen, Wei-Ching Williams, An English and Chinese Standard Dictionary, Shanghai: Commerial Press, 1908, p. 1438.
1916	Microbe, 微生物, 微菌, 稵, miao	Hemeling, Karl Ernst Georg, English-Chinese Dictionary of the Standrd Chinese Spoken Language (官話) and Handbook for Translators, Shanghai: Statistical Department of the Inspectorate General of Customs, 1916, p. 870.

According to this table, it can be clear that the use of “Xi Jun” (细菌) as the translation of “bacteria” and “bacillus” is not derived from Japan, that it is likely to be the production of the German, English and Chinese interaction since the late Qing Dynasty. It should be noted that this ambiguous definition of “microbes” seems to continue throughout the decade of the late Qing Dynasty.

In other words, during the late Qing Dynasty, the microbiological, qi (气), microbial and mold between the translation and its mixed state in the name of the real does not match the real. For instance, wind, insect, qi (气), jun (菌) and other traditional concepts are given new meaning, but they also do not completely lose the original meaning, in fact, to produce a kind of hybridity in culture.

Conclusion

The understanding of the ancients of the disease located in the three-dimensional space-time, including both spirits and divisions. For example, “六淫外邪” (six evils), and “三尸九虫” (three dead nine insects), all of them are closely related with the diet. The snake and insects in “Shan Hai Jing” (山海经), in fact, are not only based on a geographical sense of the concept of the museum, but also affected the image of the construction of insects.

When the insects are associated with the human body, insects and qi (气) also show a mutual medical knowledge, so insect and qi (气) is not mutual criticism of the two theories. Correspondingly, the assertion of the

poisoning is also enhanced by the concept of insect disease. In addition, the complex relationship between “worm” and “wind” has become one of the paths of cognitive microcosm.

It should be pointed out that when the bacterial disease theory came from the West to the East in the late nineteenth century, the bacterial disease theory in the same period of the West has also just started, and during the late Qing Dynasty in China it was also “new knowledge” being translated, which related to the “bacteria” concept of the generation problem.

After the introduction of bacterial disease theory, Chinese people will learn from it from two paths: one is the ancient natural history of the insect concept, the other one is the traditional Chinese medicine of the insect and qi concept. The former is specific. The latter is abstract, so it will show people the understanding of the bacteria, the first reaction being the concept of the introduction of insects.

The translation of bacteria is done, from the perspective of transliteration, the “壁他利亚” (Bi Ta Li Ya) on the translation of the bacteria, which itself is the common strategy of translation of western new terms in the late Qing Dynasty.

At the same time, people also translated bacteria into microbes, insects, mold, etc. In fact, this is based on the shape of bacteria, size, reproduction and other properties to make judgement. Thus, in the late nineteenth century, the classification of biology, the actual classification of the bacteria is not as clear as today, which also affected the understanding of “Xi Jun” (细菌) and bacteria.

Combined with the old newspaper, the translations during the late Qing Dynasty are often used or mixed, showing globalization and cross hybridity in the sense of intercultural communication. The resulting knowledge is certainly “hybrid”,raised by Anna Winterbottom(2014), for the diverse ways of knowing are drawing together information from diversie sources.The traditional medicine theory of the “old bottle” was loaded into the “new wine” of the emerging bacterial disease theory.

Nevertheless, it should be noted that the use of “insects” as the imagination model is only one kind of practice, at the end of the Qing Dynasty, the concept of disease or epidemics was much more diverse and complicated than we thought, so the spread and development of the concept of “bacteria” in the early Republic of China can only be discussed later.

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