

Ancient Chinese People's Knowledge of Macrofungi to 220 AD

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As the first step of exploring ancient Chinese people's knowledge of macrofungi, several aspects including the Chinese characters historically used for macrofungi, the natural descriptions of macrofungi, the historical accounts involving macrofungi, the medicinal properties of macrofungi, the ways in which macrofungi were categorized among living things and macrofungi in literature during the period up to 220 AD (the end of the Han dynasty) are examined on the basis of ancient Chinese texts. It is worthwhile to note that with the transformation from a philosophy to a religion in Taoism, more naturalistic descriptions of macrofungi before the Qin dynasty shifted to the accounts with supernatural effects after the Qin dynasty, and the representative macrofungus was Zhi. This paper aims to lay the foundation for further studies with emphasis on later periods in Chinese history.

Keywords: macrofungi; ancient China; 220 AD; Zhi.

Introduction

Since Robert Gordon Wasson proposed in *SOMA: Divine Mushroom of Immortality* that “Soma” in *RgVeda* was a hallucinogenic mushroom known as *Amanita muscaria*, his identification of “Soma” has been gradually accepted by more and more scholars including the Indologist Wendy Doniger O'Flaherty (Wasson, 1968; Wasson & O'Flaherty, 1982, pp. 591–603). Beside his studies of the roles of mushrooms in different cultures, Wasson promoted a new field — ethnomycology, a branch of ethnobotany. People began to realize that actually mushrooms played an important role in human life. In the history of the Roman Empire, mushrooms were not strange things. In Suetonius's *The Lives of the Twelve Caesars*, Tiberius paid Asellius Sabinus two hundred thousand sesterces for a dialogue, in which he had introduced a contest of a mushroom, a fig-pecker, an oyster and a thrush (Tranquillus, 1931, p. 145); Claudius was said to be poisoned by Agrippina, who served the drug to him with her own hand in mushrooms, a dish of which he was extravagantly fond (Tranquillus, 1931, p. 236); Nero used to laud mushrooms, the vehicle in which the poison was administered to Claudius, as the “the food of the Gods” (Tranquillus, 1931, p. 262); Domitian's father once even openly ridiculed Domitian at dinner for refusing mushrooms, saying that he showed himself unaware of his destiny in not rather fearing the sword (Tranquillus, 1931, pp. 355–356). Up to the present, however, there is a lack of systematic and detailed studies on the history of mycology. The present paper aims to reveal the knowledge of macrofungi contained in the ancient Chinese literature to 220 AD, make it the first step of studying the history of mycology in China.

Before 220 AD, China had undergone the following dynasties: the Xia dynasty (c. 2070 – c. 1600 BC), the Shang dynasty (c. 1600 – 1046 BC), the Zhou dynasty (1046–221 BC), the Qin dynasty (221–206 BC) and the Han dynasty¹ (206 BC – 220 AD). The source mate-

¹ In Chinese, these dynasties are: 夏 (Xia), 商 (Shang), 周 (Zhou), 秦 (Qin) and 汉 (Han). The words in the brackets are the Pinyin words of the corresponding characters. Pinyin (literally ‘spell-sound’) is the standard system of romanized spelling for transliterating Chinese, which has been implemented in Chinese Mainland since 1958. In this paper, the names of ancient Chinese people, places and dynasties

rial cited in this paper was all written or compiled in the latter three dynasties but the material from the *History of the Later Han Dynasty*, and some useful commentaries written by the scholars of later periods are introduced to make a few obscure citations more understandable. Forged books, such as *The Book of Master Lie*² which is thought to be written posterior to the Han dynasty but in the name of Lie Zi who lived in the Warring States period (475–221 BC), will not be used for reference, although it contains some words concerning macrofungi. The reason why I take 220 AD as the divide is: the knowledge of macrofungi had been tinged with Taoist mysticism since 221 BC, the year when Emperor Ying Zheng³ (259–210 BC) unified the country by the sword and founded the first centralized dynasty of Imperial China — the Qin dynasty. The Qin dynasty lasted only 16 years, but the subsequent Han dynasty lasted 426 years. Additionally, the religious aspect of Taoism had developed and finally involved into the Taoism as a religion in the Han dynasty. So, in order to reveal the change from the naturalistic description before 221 BC to the description tinged with Taoist mysticism after 221 BC, it's reasonable to take the Qin dynasty and the Han dynasty as a whole period.

The word “mushroom” is usually used to refer to a fungus that takes the form of a domed cap on a stalk. Some mushrooms can be eaten, but many are poisonous. The poisonous mushroom is usually called a “toadstool”. Neither “mushroom” nor “toadstool”, however, is appropriate in comparison with “macrofungi”. The fungi called mushrooms or toadstools are all agarics. And the agarics as a group belong to the macrofungi which refer to the fungi whose fruiting bodies can be seen with naked eyes. According to the definition of macrofungi, the fungus *Auricularia auricula*, which doesn't have the form of a mushroom, is included. That's why I use “macrofungi” instead of “mushroom” in this paper. “Macrofungi” is not a taxonomic conception. Based on the *Ainsworth & Bisby's Dictionary of the Fungi* (1983), macrofungi consists of the Ascomycotina division and the Basidiomycotina division. It is estimated that there are 1.5 million species of macrofungi on earth, but only about 69 thousand species among them are described (Redecker, 2002, pp. 125–130).

Macrofungi appeared on earth at least tens of million years ago, far earlier than the appearance of *Homo sapiens*. The direct evidence is the fossil macrofungi. For most of the fruiting bodies of macrofungi are tender and easy to decay, the number of discovered fossil macrofungi is much smaller than that of fossil wood-plants or animal bones. Still, the small quantity of fossil macrofungi can help us unveil the long history of macrofungi. The records of them are worth summarizing below.

In 1990 and 1997, *Coprinites dominicana* (Poinar & Singer, 1990, pp. 1099–1101) and *Protomyces electra* (Hibbett et al, 1997a, pp. 981–991) were discovered in the ambers from Dominican Republic respectively. The former macrofungus which has a full-gilled cap and a stalk with the upper part left is already 35–40 million years old, and has a close relationship with the *Coprinus* genus; The latter one which has a complete fruiting body is 15–30 million

are written in the Pinyin manner, and so are the titles of ancient Chinese works if there aren't any appropriate translations. Besides, most of the Pinyin words in the text are noted with their Chinese characters in the references part.

² *The Book of Master Lie*, 列子 (Pinyin: Lie Zi). Lie Zi is not only the Pinyin title of *The Book of Master Lie*, but also the name of the author. In the book, the macrofungi are claimed to grow in the soil which is rich in humus, and decay fast. The author had noticed the importance of humus which can nurture the macrofungi. For the book is considered to be forged, it won't be cited in this paper.

³ 嬴政 (Pinyin: Ying Zheng), reigned 246 BC–210 BC. He thought his empire would last forever, and therefore aspired to be immortal. The celestial beings and the medicines which could keep people immortal were both what he wanted most.

years old, and belongs to the Tricholomataceae family. In 1995, *Archaeomarasmius leggetti* (Hibbett et al, 1995, p. 487), a 90–94 million-year-old macrofungus whose fruiting body is encased in amber too, was discovered in New Jersey. Based on the characteristics of the fruiting body whose gills and the stalk are fragmentary, it is similar to the *Marasmius* sp. and belongs to the Tricholomataceae family. And In 2003, Hibbett et al. reported the fourth fossil macrofungus *Aureofungus yaniguaensis* (Hibbett et al, 2003, pp. 685–687), a 15–20 million-year-old new species which was discovered in Dominican Republic and perfectly preserved in amber, belonging to the agaricoid Homobasidiomycete class. In 1997, British Columbia, Lepage et al. discovered the fossil ectomycorrhizae (Lepage et al, 1997, pp. 410–412). Based on the morphological characteristics, the mycorrhizal fungi from the mid-Eocene were suggested to have a close relationship with basidiomycete genera *Rhizopogon* and *Suillus*. In 1958, fossil *Phellinites digiustoi*, which was identified as a kind of poroid fungi from the Jurassic Period, was discovered in Patagonia. But Hibbett et al. didn't agree with the identification, considered it as a mid-Cretaceous *Phellinus* fungus (Hibbett et al, 1997b, pp. 1005–1011). Moreover, in 2004, two fossil poroid hymenophore fragments were discovered on Vancouver Island (Smith et al, 2004, pp. 180–186). In one specimen, *Quatsinoporites cranhamii*, known as the earliest polypore, is from the Cretaceous Period; in the other specimen, *Appianoporites vancouverensis* is from the Eocene Epoch. Both of them are new species which belong to two genera of the Hymenochaetaceae family. There is also the news about the discoveries of fossil macrofungi in China, but the authenticity of the news is waiting to be verified, and serious research papers on the fossils cannot be found.

Fossil macrofungi indicate that the relationship between macrofungi and human beings should be established further than it was recorded by written words for the first time. The Chinese historian Guo Mo-ruo speculated that the ancient Chinese people who lived in the Yangshao culture period of Neolithic age might have already taken macrofungi as one of their food sources (Guo, 1977, p. 58). Archeologists, however, haven't found any relic of macrofungi from that period, maybe that's because macrofungi are too putrescible to preserve. Still, the value of his speculation is not providing us with an earliest period of eating macrofungi, but pointing out that ancient Chinese people should know the existence of macrofungi and eat them much earlier than they were firstly recorded in writing languages, if considering the long coexistent history of human beings and macrofungi. The primary difficulty of studying the ancient Chinese people's knowledge on macrofungi to 220 AD is the inadequacy of source material, especially the material before the Qin dynasty. Still, this study is an important contribution to the biological sciences and civilization in China. The first step of the study begins with recognizing and discussing the Chinese characters or words on macrofungi.

The Chinese characters or words on macrofungi in Chinese dictionaries

Ancient Chinese monographs on the characters are traditionally classified according to their emphasis on the meanings, structures or pronunciations of the characters. For the three categories of monographs are all on interpreting the characters, not totally distinguished from each other, it is possible to call them dictionaries. Strictly speaking, the extant first ancient dictionary is considered to be *Analytical Dictionary of Characters*. But the earlier work

Literary Expositor has already had the rudimentary form of a dictionary, so it is regarded as a dictionary in this paper too⁴.

The content of *Literary Expositor*, which was finally stabilized in Qin (306 BC–207 BC) or Han (206 BC–220 AD) dynasty, originated from the material in Zhou dynasty (1046 BC–256 BC). It is a pity that the author or compiler of *Literary Expositor* is unknown, although it's the initial work of putting emphasis upon the meanings of Chinese characters and words. However, for the dictionary is too old and simple, nowadays even the meanings are hard to understand. Fortunately, many commentaries by later scholars are reserved in *Explanations of the Commentaries on the Literary Expositor*, facilitating our ability to understand and use the dictionary. The best-known scholar of commenting the *Literary Expositor* is Guo Pu (276–324 AD), who had also illustrated it elaborately. The illustrations of macrofungi in his work *Commentary on the Literary Expositor with Illustrations* provide us with the precious visual information beyond the literal meanings⁵.



Figure 1. Illustrations of macrofungi from *Commentary on the Literary Expositor with Illustrations* (Guo, 1985)

In *Literary Expositor*, chapter *Interpretations of the herbs*⁶, the first character on macrofungi is 茵 (Guo & Xing, 1999, p. 236) (archaic spell-sound: Xiu), whose meaning is merely another character 芝 (Zhi). According to Guo Pu's commentary, Zhi is the herb that can flower three times per year and symbolize good fortune⁷. “Three” in the ancient Chinese lan-

⁴ *Analytical Dictionary of Character*, 說文解字 (Pinyin: Shuo Wen Jie Zi); *Literary Expositor*, 爾雅 (Pinyin: Er Ya).

⁵ *Explanations of the Commentaries on the Literary Expositor*, 爾雅注疏 (Pinyin: Er Ya Zhu Shu); Guo Pu (郭璞), whose exceptional talent for paleography is revealed in the commentaries on several classics including *Literary Expositor*; *Commentary on the Literary Expositor with Illustrations*, 爾雅音圖 (Pinyin: Er Ya Yin Tu).

⁶ *Interpretations of the herbs*, 釋草 (Pinyin: Shi Cao). This is the thirteenth chapter (also the eighth volume) of the *Literary Expositor*. All the characters in this chapter concern the herbs.

⁷ Guo Pu was greatly influenced by Taoism. Taoism was initially referred to as a Chinese philosophy based on the writings of Lao Zi. In the Han dynasty (206 BC–220 AD), especially the Eastern Han dynasty (25 AD–220 AD), the religious aspect of Taoism had emerged and finally promoted the appearance of Taoism as a Chinese religion. It's difficult to completely distinguish Taoism as a philosophy from Taoism as a religion, for their thought has much in common. Actually, Taoism as a religion

guage sometimes means “more than two”, like “a couple of” in English sometimes means “a few”. Guo Pu thought it could flower, possibly because he treated the cap of a macrofungus as the flower. Flower is the conception borrowed from botany. Combined with the illustration by Guo Pu (Fig. 1A), Zhi should be a species of the *Ganoderma* genus, especially *Ganoderma lucidum*⁸. *Ganoderma lucidum* is a russet hard bracket-fungus which usually grows on broad-leaves such as maple and oak, often from the tree roots. The *Ganoderma* sp. grows in summer or autumn (e.g. *Ganoderma lucidum*), or during all-year time (e.g. *Ganoderma fulvellum*). Maybe this is the reason why Guo Pu said it could flower several times per year. As for symbolizing good fortune, that’s because Guo Pu’ thought was greatly influenced by Taoism. In Taoist culture, Zhi is endowed with special meanings which will be discussed below. Xiu as a character is seldom used by the people of later periods in history except for being included in some later dictionaries, while Zhi is frequently mentioned in plenty of later works from histories to poetry. Up to the present, Chinese people still consider Zhi as an organism having magical efficacy.

The word 中廡 (Zhong Kui) in the chapter means 菌 (Jun) which is smaller than Zhong Kui (Guo & Xing, 1999, pp. 256–257). Guo Pu’s commentary on the word is: it’s a cap-like edible macrofungus growing on the ground; Zhong Kui and Jun are the two names of the macrofungus; in Guo Pu’s time, people in the south of China called it Tu Jun (Chinese: 土菌) or Kui Chu (Chinese: 廡厨). As Guo Pu’s illustration (Fig. 1B) shows, the brim of the pileus is in the shape of radicalized creases. Some edible species of the *Marasmius* genus meet this characteristic. *Marasmius oreades*, which tastes delicious, causes the formation of fairy rings in the wild and has somewhat obvious creases on the brim of the pileus when it is wet, may be the right macrofungus. In the edible species of the *Amanita* genus, *Amanita fulva* or *Amanita nivalis* in the middle stage of growth may also be the right macrofungus, while the others have either annuli on the stalks (e. g. *Amanita caesarea*) or squamae on the pilei (e. g. *Amanita inaurata*). Both the annuli and the pilei can not be found from the illustration. The use of Zhong Kui as a word resembles that of Xiu, while Jun is still used by Chinese people today.

In addition, the chapter has embodied another word 出隧 (Chu Sui), meaning 蕈蔬 (Qu Shu) (Guo & Xing, 1999, p. 243). Guo Pu suggested that it looked like a macrofungus growing on the ground and grew in grass of *Zizania caduciflora*. And in his time, people in the south of China said it tasted sweet and smooth. With reviewing the correlative illustration (Fig. 1C), it shall probably be a delicious edible species of the *Agaricus* or the *Tricholoma* genus, especially *Agaricus arvensis*, *Agaricus bisporus*, *Agaricus campestris* or *Tricholoma matsutake*. Although the above four macrofungi have annuli on the stalks, the annuli are either easy to come off the stalks or not obvious. So they accord with the characteristics of the macrofungus in the illustration.

had contributed much knowledge of natural sciences to the civilization in China. Some knowledge of macrofungi is included in a few ancient works written by Taoists. From the description of Zhi in the works, we can see that it is the most important macrofungus in Taoist culture, symbolizing happiness, good fortune, good health and even immortality. The view of regarding Zhi as the herb symbolizing good fortune not only indicates the influence of Taoism on Guo Pu, but also suggests its special significance in Taoist culture.

⁸ It is called Ling Zhi (Chinese: 靈芝) in China, but Ling Zhi has been generally applied to a number of closely related species of the genus *Ganoderma* (or the family *Ganodermataceae*). Ancient taxonomy is in the preliminary stage and the records on macrofungi are often too simple, therefore it’s dangerous to comprehend the character on macrofungi as referring to only one species, although sometimes we can identify a single one.

Chu Sui and Qu Shu are two words which lack vitality, here I cannot give any sentence from the non-lexical works which were written later than the dictionary for the example of the use about them.

Analytical Dictionary of Characters, which is the acknowledged first dictionary in Chinese history, was finished in 100 AD by Xu Shen⁹ and contributed to the emperor in 121 AD by his son. There are totally 9353 different characters in this dictionary, to which the characters in the form of Small Seal¹⁰ are attached. Xu Shen suggested a new way to study the Chinese characters, discussed the pronunciation, structure and meaning of each character and combined them together, made the dictionary an absolutely necessary reference book while studying ancient Chinese characters. It's interesting that many characters and their meanings in the dictionary reveal the domino effect, and the characters on macrofungi are not excluded¹¹. The archaic pronunciations of the characters are easy to know according to the commentary by later scholars.

蕈 (Ruan, Small seal: 蕈), which has another name 菴朮, means 木耳 (Duan, 1992, p. 36). 木耳 refers to the *Auricularia* species which usually grow on trees or rotten wood.

蕞 (Xun, Small seal: 蕞) means 桑蕈 (Duan, 1992, p. 36). For the meaning of 桑 is a mulberry tree (scientific name: *Morus alba*), 桑蕈 refers to the *Auricularia* species which grow on mulberry trees.

菌 (Jun, Small seal: 菌) means 地蕈 (Duan, 1992, p. 36). 地 means ground, so 地蕈 can be considered as the macrofungi growing on the ground. The meaning of 蕈 has changed in the word, for the *Auricularia* species don't grow on the ground. No more interpretation of Jun is left in the dictionary, but compared with Guo Pu's commentary and illustration, it should be agarics at least. Now in China, the character 菌 is more widely used in the form of “××菌” to refer to the organisms including bacteria and fungi.

𦵑 (Lu, Small seal: 𦵑) means 菌 (Duan, 1992, p. 22). Only when the agarics grow in clumps on farmlands, they can be called Lu. This character has no longer been used since then.

The last character on macrofungi is 芝 (Zhi, Small seal: 芝) (Duan, 1992, p. 22), meaning the divine herb¹². It's one of the two characters which also appear in the *Literary Expositor* (the other is Jun). It should be the *Ganoderma* species too, especially *Ganoderma lucidum*. From the view of taking the macrofungus as the divine herb, it indicates that Xu Shen was influenced by Taoism, as well as Guo Pu. Zhi had gradually become the most influential macrofungus since it was described as a divine herb.

⁹ 許慎 (Pinyin: Xu Shen). He lived in the Eastern Han dynasty, but his dates of birth and death are not clear.

¹⁰ Small Seal (Chinese: 小篆) was the main writing type of Qin kingdom. When Ying Zheng found Qin dynasty in 221 BC, he began to popularize Small Seal nationwide. Small Seal was gradually replaced by Li-script (Chinese: 隸書) in Han dynasty. On the Chinese Palaeography, see *Chen M.J.* An Introduction to Chinese Palaeography (in both Chinese and English). Beijing: Zhonghua Book Company, 2006.

¹¹ It'll show below that the sequence of knowing what the characters mean is 蕈→蕞→菌→𦵑. The premise of unveiling the latter character's meaning is knowing what the former one means.

¹² Surprisingly, except that 𦵑 is not used any more, the archaic pronunciation of 蕈, 蕞, 菌 or 芝 is consistent with each of their modern pronunciations.

Naturalistic descriptions of macrofungi

As one of the masterpieces on ancient Chinese geography, *Classic of the Mountains and Rivers*¹³ was finally compiled in the early Western Han dynasty (206 BC–8 AD). It mentions Mengzi Mountain as the place where abundant macrofungi and the herb *Lepironia articulata* are growing (Yuan, 1980, p. 111). It also mentions another mountain called Jun Mountain (Yuan, 1980, p. 458). For Jun means macrofungi (agarics), Jun Mountain may refer to the mountain which abounds with macrofungi. Though the real locations of the above two mountains are still waiting to be unveiled, it demonstrates that the ancient Chinese people begun to take notice of the geographical and environmental factors of macrofungi's growth. In fact, if conditions meet the growth requirements, macrofungi can grow everywhere. However, for mountains are usually far away from crowded people and pollution, the environment there is better than that of the residential districts, and more beneficial for macrofungi's growth. Therefore, it's comprehensible that the macrofungi are involved with mountains in this work. Besides, in *Classic of the Mountains and Rivers*, the word Jun Ren (literally "a macrofungus person") is used to describe the persons who are short and small in shape (Yuan, 1980, p. 384). This interesting and dramatic description reveals people's impression on the macrofungi's small shape and makes macrofungi gain a literary use of metaphor.

Ancient Chinese intellectuals, especially the Confucians, attached great importance to moral culture and knowledge. Although Confucius (551–479 BC) not only stressed the importance of being erudition, but also suggested his students be acquaint with animals and plants at least (He & Xing, 1999, p. 237), he had never mentioned macrofungi. The only Confucian classic mentioned macrofungi is *Record of Rites*¹⁴ (compiled by Dai the Younger, c. 73 – c. 50 BC). It mentions Zhi (*Ganoderma* sp.) as a food. And according to the commentary by Zheng Xuan¹⁵, it's one of the foods supplied for royal banquets (Zheng & Kong, 1999, pp. 843–847). However, the fruiting bodies of the *Ganoderma* sp. are hard with a woody texture. So, the *Ganoderma* sp., which is noted for the prefect medicinal properties, might more likely be taken as a medicinal material at the banquets¹⁶.

Besides, the first Chinese philosopher that mentioned the growth of macrofungi is Zhuang Zhou, who lived in the middle and late time of the Warring States period (475–221 BC). The fruiting bodies of macrofungi are easy to decay. For example, the fruiting bodies of *Coprinus atramentarius* decay quickly once the spores are released. In *The Book of Master Zhuang*¹⁷, apparently, we can find that he had noticed the characteristic, for he exaggerated that the life history of macrofungi was limited to the period from morning to night (Guo, 1985, p. 11). Moreover, he suggested that the emergence of macrofungi was caused by the steam from the soil (Guo, 1985, p. 51). In his time, there were no microscopes to use, so he could neither see the spores nor know their ability of reproduction. Still, he noticed the moist living environment of macrofungi, otherwise he would not link steam with macrofungi.

¹³ *Classic of the Mountains and Rivers*, 山海經 (Pinyin: Shan Hai Jing).

¹⁴ *Record of Rites*, 禮記 (Pinyin: Li Ji). The compiler of the classic is usually called Dai the Younger, whose real name is Dai Sheng. For his uncle Dai De had also compiled a book called Li Ji, people use "Dai the Younger" or "Dai the Elder" to distinguish between the two works.

¹⁵ 鄭玄 (Pinyin: Zheng Xuan; 127–200 AD). He is a great scholar whose commentaries on the Confucian classics become the required readings for later Confucian scholars.

¹⁶ The medicinal properties of Zhi (*Ganoderma* sp.) will be discussed below.

¹⁷ 莊子 (Pinyin: Zhuang Zi). This is the honorific title for addressing the philosopher Zhuang Zhou (Chinese: 莊周), as well as the book title of *The Book of Master Zhuang*.

Although he provided us with an incorrect explanation for the emergence of macrofungi, his simple materialistic view deserves admiration. *The Book of Master Zhuang* also mentions an organism called Yang Xi¹⁸ which grows beside bamboos (Guo, 1985, p. 625). Later commentators didn't know exactly what it was. In my opinion, it should refer to the *Dictyophora* species which usually grow in bamboo forest and taste good.

The work *Master Lü's Spring and Autumn Annals*, which was written by the group of scholars gathered by Lü Bu-Wei¹⁹ and finished in 239 BC, mentions the macrofungi growing in the southeastern districts of China as one of the fine flavorings (Chen, 2001, pp. 746–764). What's more, the versatile scholar Mo Di²⁰ (c. 468–376 BC) had initially conceived applying macrofungi to signal communication on battlefields: when guarding a castle, if warriors somewhere needed food, they could raise and wave the flag painted with the shape of a macrofungus (agaric). Once the people in charge of rear service saw the waving flag, they would bring the warriors food soon. In addition to the macrofungus flag, Mo Di had also conceived the other fifteen kinds of signal flags for other uses when guarding a castle (Wu, 1993, pp. 903–904). These flags were so strange that the enemies would not know the real meanings of them. His brilliant idea had never come true during his lifetime, but it enriched the war theory of communication on battlefields. Meanwhile, the idea of treating macrofungi as the sign of food suggests that the edible macrofungi had been widely picked and eaten by people then, otherwise they would not be used to represent the food.

The macrofungus *Wolfiporia cocos* is mentioned in *Historical Records*²¹. As it mentions, Fu Ling²² (*Wolfiporia cocos*) is the root of the pine tree which has grown for one thousand years; it lies four to seven Chi²³ beneath the ground and looks like a flying bird; people who have eaten it will be immortal²⁴ (Sima, 1963, p. 3226). Actually, Fu Ling is a macrofungus which usually grows with the roots of a pine tree. This is the reason why it is said to be the root of the one thousand-year-old pine tree. And Fu Ling here refers to the sclerotium form of *Wolfiporia cocos*. The sclerotium is a dormant body consisting of a mass of hyphae and growing beneath the ground. The shape of a sclerotium is not very regular. By saying it looks like a flying bird, it may emphasize the irregularity of the sclerotium. Certainly, it has exaggerated the irregularity, for the sclerotium is approximately like a ball in shape. However, the most important is, it points out that Tu Si²⁵ grows upon Fu Ling. This biological phenomenon is recorded in *The Book of*

¹⁸羊奚 (Pinyin: Yang Xi).

¹⁹*Master Lü's Spring and Autumn Annals*, 吕氏春秋 (Pinyin: Lü Shi Chun Qiu); Lü Bu-Wei, 吕不韦 (? – 235 BC), who was a rich businessman who helped Ying Zheng's father come to the throne in 249 BC. As a reward for the help, he was appointed as the prime minister.

²⁰墨翟 (Pinyin: Mo Di).

²¹*Historical Records*, 史記 (Pinyin: Shi Ji). *Historical Records* is considered to be the most important history of China down to the 2nd century, comprising 130 volumes. Its author Sima Qian (Chinese: 司馬遷) is the first great Chinese historian. A small part of this work of the present edition was added by other scholars later than him.

²²Afterward, the word “Fu Ling” (Chinese: 伏靈) has been substituted by another one: 茯苓, which now is the formal Chinese name of *Wolfiporia cocos*.

²³Chi (Chinese: 尺) is a traditional Chinese unit for measuring length. 1 Chi = 23.1 cm then.

²⁴The description on Fu Ling (*Wolfiporia cocos*) is written by Chu Shao-sun (Chinese: 褚少孫), not Sima Qian. He is a Doctor of Confucian classics, living in the late Western Han dynasty.

²⁵兔絲 (Pinyin: Tu Si). This word is similar to 菟絲 or 菟絲子, which now is used to refer to *Cuscuta chinensis*. Here, 兔絲 should mean the filaments which are as white as the fur of the rabbit (兔=rabbit). The filaments are the hyphae of *Wolfiporia cocos*.

the Prince of Huai Nan too (He, 1998, p. 1121). Here the Tu Si doesn't refer to the *Cuscuta chinensis*, for the *Cuscuta chinensis* doesn't grow with *Wolfiporia cocos*. The Tu Si should refer to the hyphae which often appear on the place where the sclerotium of the *Wolfiporia cocos* grows. *The Book of the Prince of Huai Nan* also mentions that if Fu Ling is dug out, Tu Si will die (He, 1998, p. 1221). The scientific basis is that the hyphae on the ground are produced by the sclerotium underground, if the sclerotium is dug out, the hyphae will die. Another macrofungus which also produces sclerotia is *Grifola umbellata*. It is taken as a medicinal material in *The Book of Master Zhuang*²⁶ (Guo, 1985, pp. 867–868).

The phenomenon of the abnormal growth of Zhi (*Ganoderma* sp.) is recorded in *History of the Former Han Dynasty*²⁷. It mentions that the Zhi, which has the shape of nine stalks linking with one pileus, was found growing in the imperial palace in 109 BC (Ban, 1964, pp. 193; 1046–1065). Beside, it mentions the appearance of the Zhi of nine stalks in another imperial palace in 62 BC too (Ban, 1964, p. 259). The appearance of the abnormal formation of Zhi is quite possible, because the interior of the palace lacks enough light, and the humidity in the palace is lower than it in the wild. Both the reasons cause the fruiting body of Zhi to grow abnormally and form branches. Although it was just an abnormal formation of the *Ganoderma* sp., the emperor promulgated the edict pardoning the culpable persons nationwide for its appearance. In addition, as the great philosopher Wang Chong (27 – c. 97 AD) said in his work *Discourses Weighed in the Balance*²⁸, the Purple Zhi²⁹ cultivation was similar to the bean cultivation (Huang, 1990, pp. 128, 1215). This cannot be the proof of Zhi cultivation in the Eastern Han dynasty, for the two methods are totally different: the Purple Zhi is a wood-rotting macrofungus growing on wood or trees, while the bean is usually grow on the plough land where there is no wood; the Purple Zhi reproduces by spores, while the bean reproduces by beans. I don't think the ancient people could find the reproductive function of spores then. Actually, from the works before 220 AD, no more words can be provided to prove the authenticity of the Purple Zhi (even macrofungi) cultivation. Wang Chong's philosophical view on the growth of Zhi is considering it as the result of the harmoniousness in the soil (Huang, 1990, p. 843).

Macrofungi in historical events

Among the macrofungi, Zhi is the only macrofungus which was seriously treated by the emperors and the officials. The emperors considered the appearance of Zhi as the affirmation of his statesmanship, while the officials regarded it as the chance of flattering the emperor. In 219 BC, the emperor Ying Zheng, who had unified China and founded the Qin empire in 221 BC, sent thousands of children by sea to look for the celestial beings

²⁶ In *The Book of Master Zhuang*, the word referring to *Grifola umbellata* is 豕零. 豕零=猪苓. The latter word was used more frequently in history. And now it becomes the formal Chinese name of *Grifola umbellata*.

²⁷ *History of the Former Han Dynasty*, 漢書 (Pinyin: Han Shu).

²⁸ 王充 (Pinyin: Wang Chong). He is a great thinker of simple materialism. But unfortunately, on the cultivation of macrofungi, his words are idealistic (See the discussion below). *Discourses Weighed in the Balance*, 論衡 (Pinyin: Lun Heng). This work consists of 85 chapters, written to criticize the fallacious theories.

²⁹ The Purple Zhi refers to *Ganoderma sinense* (see the fifth part of this paper).

who lived on the islands (Sima, 1963, p. 247). He wanted to be immortal, and death was his taboo. In 215 BC, he sent Lu Sheng to look for the two celestial beings called “Xian Men” and “Gao Shi”, but Lu Sheng brought back nothing (Sima, 1963, pp. 251–252). Later, another three persons were sent to search for the divine medicinal materials. In 212 BC, Lu Sheng excused himself for returning with empty-handed. According to the excuse, what he intended to find on the sea included Zhi (*Ganoderma* sp.), supernatural medicinal materials and celestial beings (Sima, 1963, p. 257).

Another great emperor who aspired to be immortal is Liu Che³⁰. In 109 BC, he went to the Donglai mountain to meet the celestial beings that were said to be willing to see him, and had stayed there for a few days. At last, he saw nothing but huge footprints. The disappointed emperor sent thousands of people to find for celestial beings and Zhi. To attract the visit of celestial beings, a building, which was said to reach the heaven, had been constructed by order of the emperor. In the summer of the year, the Zhi had been found growing in the imperial palace which located in Ganquan. Due to this phenomenon, he promulgated the edict pardoning the culpable persons nationwide (Sima, 1963, pp. 451–486, 1399–1400; Ban, 1964, pp. 2241–2242).

Since Qin dynasty, Zhi had begun to play an important role in people’s life. It was not only thought to be the medicinal material that could keep a person immortal, but also became the reflection of the prosperity of the country. In addition to the above example of promulgating the edict duo to the appearance of Zhi, there are other examples of specially recording the appearance of Zhi.

In 62 BC, according to the emperor’s edict, a Zhi of nine stalks was found growing in the Hande imperial palace.

When China was in the reign of the emperor Liu Yan (reigning 1–5 AD), Wang Mang once extolled the virtues of the emperor in a report to the latter³¹. As he said, just due to the virtues, several phenomena occurred, including the growing of Zhi (Ban, 1964, pp. 4049–4050).

In 74 AD, Zhi was discovered to be growing in front of the imperial palace (Fan, 1973, p. 121).

In 78 AD, Zhi was contributed to the emperor from the place called Ling Ling (today’s Yong Zhou city, in Hu Nan province).

In 80 AD, Zhi was contributed to the emperor from Ling Ling again (Fan, 1973, p. 141).

In 87 AD, according to his edict, the emperor changed the year name from Yuan He to Zhang He, for several auspicious phenomena had occurred frequently, including the appearance of Zhi (Fan, 1973, p. 157).

In 147 AD, as the distant descendant of the first emperor of the Eastern Han dynasty, Liu Bo was appointed as the king of the Fuling district³². Meanwhile, Zhi was said to grow in the mansion where the treasury department situated (Fan, 1973, p. 290).

In 181 AD, counties and kingdoms contributed Zhi to the emperor together (Fan, 1973, p. 345).

³⁰ 刘彻 (Pinyin: Liu Che). He reigned 140–87 BC, usually called Han Wu Di (Chinese: 汉武帝) in history.

³¹ 刘衍 (Pinyin: Liu Yan); 王莽 (Pinyin: Wang Mang; 45 BC–23 AD). Wang Mang founded the Xin dynasty (9 AD–23 AD) after the Western Han dynasty.

³² 刘勃 (Pinyin: Liu Bo); 阜陵 (Pinyin: Fuling). Fuling approximately refers to today’s Quanjiao county in Anhui Province.

Certainly, it's ridiculous to believe that Zhi has the ability of reflecting the prosperity of the country. Speaking of this, there is an interesting and ironical story about Zhi. In 120 AD, Zhi was discovered to be growing on the border of the Yu Zhang county (today's Nanchang city, in Jiangxi province). Probably in order to draw the attentions of the emperor, the mayor who intended to report to the emperor, consulted the scholar Tang Tan about the matter. And Tang Tan said, "Now the enates are high and mighty, and the power of the lineal members of the royal family are decreased. Is the appearance of Zhi an auspicious phenomenon?" (Fan, 1973, p. 2729).

Records of the medicinal properties of macrofungi

In December, 1973 AD, plenty of silk writings were unearthed from the Han Mausoleum which is situated in Mawangdui³³. Among the writings, there is a medical manuscript which had no title and was finally titled *Prescriptions for Fifty Two Diseases*³⁴ by the collators. This manuscript consists of the contents and the text, includes 280 prescriptions for the 55 diseases and mentions 247 medicinal materials. The host of the mausoleum was buried in 168 BC. From the style of the Chinese writing, it is estimated that the manuscript was written between the Qin dynasty and the Western Han dynasty, therefore its content should be earlier than the manuscript (The Team of Collating Silk Writings from the Han Mausoleum in Mawangdui ["TCSW" for short], 1979, pp. 179–208). It's the oldest Chinese pharmacy work so far.

Prescriptions for Fifty Two Diseases mentions three macrofungi: Liu Xun (TCSW, 1979, p. 93), Fu Ling (TCSW, 1979, p. 120) and Lei Shi³⁵ (TCSW, 1979, pp. 128–129). Liu Xun refers to the macrofungus growing on the willows; Fu Ling refers to the *Wolfiporia cocos*; and Lei Shi refers to the *Omphalia lapidescens*. According to a prescription, Liu Xun, together with *Artemisia argyi*, is used to cure the itch around the anus which is caused by the hemorrhoids. The method is: burn Liu Xun and *Artemisia argyi* together in a dug hole, put a pot with the bottom broken on the hole and seat the patient on the pot, allowing his anus to be smoked by the burning stuff. Another prescription for the itch is: pick the relatively big Fu Ling and put it in the stone mortar, pound it until smooth, and then mix it and the animal fat to big boluses which are later used to put on the itching skin. To cure the festering carbuncle, a prescription suggests the liquid, which is produced by pounding Lei Shi and soybeans together, be used to apply to the location where the carbuncle grows. The liquid should be applied to the location once a day for sixty days, and the location should be washed before. Besides, there is another prescription of

³³ 馬王堆 (Pinyin: Mawangdui). It's a place in the east of Chang Sha city.

³⁴ *Prescriptions for Fifty Two Diseases*, 五十二病方 (Pinyin: Wu Shi Er Bing Fang). *Prescriptions for Fifty Two Diseases* is written on the silk of 24 cm in height, consisting of 462 lines of words. See Ma J.X. & Li X.Q. The oldest prescriptions discovered in China — the silk writing *Prescriptions for Fifty Two Diseases* // *Prescriptions for Fifty Two Diseases* / The Team of Compiling Silk Writings from the Han Mausoleum in Mawangdui (ed.). Beijing: Cultural Relics Press, 1979. P. 179–280.

³⁵ 柳蕈 (Pinyin: Liu Xun; Liu means the willows); 服零 (Pinyin: Fu Ling) = 茯苓 (*Wolfiporia cocos*); 雷矢 (Pinyin: Lei Shi). 雷矢 was usually called 雷丸 (Pinyin: Lei Wan) in later medicinal books. The latter word has become the formal Chinese name of *Omphalia lapidescens* now. In this manuscript, another word which is thought to be 雷丸 is 雷屎. The collators thought 屎 was a clerical error, and the true character should be 丸, so 雷屎 is 雷矢, referring to *Omphalia lapidescens* too. See TCSW (ed.). *Prescriptions for Fifty Two Diseases*. Beijing: Cultural Relics Press, 1979. P. 40–41.

the manuscript involves Lei Shi: pound three sclerotia of Lei Shi until smooth, mix it with lard, and then reserve the mixture for using. When an infant suffers hyperpyrexia and eclampsia, the efficacious treatment is bathing the infant from his head and then immersing his trunk in cool water. The amount of water for bathing and immersing is half a Dou³⁶ for the younger infant or one Dou for the elder infant. And a third of the mixture should be added to the water in advance (TCSW, 1979, pp. 40–41).

Fu Ling is a common medicinal material in ancient Chinese prescriptions. As I've counted, in Zhang Zhong-jing's work *Synopsis of prescriptions of the Golden Chamber*³⁷, there are twenty nine prescriptions involving Fu Ling³⁸ and three prescriptions involving Zhu Ling³⁹ (*Grifola umbellata*) (Zhang, 2006). In another work of his, *Treatise on Cold-induced Febrile Diseases*, there are ten prescriptions involving Fu Ling⁴⁰ and two prescriptions involving Zhu Ling⁴¹ (Liu, 1991). The important contribution of *Synopsis of prescriptions of the Golden Chamber* to the knowledge of macrofungi also lies in recording the toxicity of some macrofungi and offering prescriptions for toadstool poisoning. As it says, the red and up-growing macrofungi which grow on wood are inedible, as well as the red macrofungi whose fruiting bodies curve upward. The toxic symptom of eating off Feng Zhu Jun⁴² is described as crying ceaselessly. Feng Shu Jun should be a hallucinogenic macrofungus, although it's difficult to know exactly what it is. If a person is poisoned by taking the toadstools, he should receive one of the following treatments: drink one Sheng⁴³ of liquid human excrement, one or two Sheng of aqueous slurry, or soya-bean milk with emetics. Although the first treatment is absurd⁴⁴ and the other two remain to be tested, they all involve taking emetics. Sometimes the poisoned person may get better if he takes emetics in time. That will help him vomit the residue of the toadstools which is able to cause more harm.

³⁶ Dou (Chinese: 斗) is a traditional Chinese unit for measuring capacity. 1 Dou=10 Liters then.

³⁷ 張仲景 (Pinyin: Zhang Zhong-jing), who is a great doctor who lived in the late Eastern Han dynasty; *Synopsis of prescriptions of the Golden Chamber*, 金匱要略方論 (Pinyin: Jin Kui Yao Lue Fang Lun). *Synopsis of prescriptions of the Golden Chamber* contains 262 prescriptions in all.

³⁸ In Chinese, the 29 prescriptions are: 侯氏黑散 (pp. 19–20), 崔氏八味丸 (p. 24), 薯蕷丸方 (p. 28), 酸棗湯方 (p. 28), 茯苓桂枝甘草大棗湯方 (p. 37), 茯苓杏仁甘草湯方 (p. 39), 赤丸方 (p. 43), 甘草乾姜茯苓白朮湯方 (p. 50), 茯苓木甘湯方 (p. 53), 木防己加茯苓芒硝湯方 (p. 56), 小半夏加茯苓湯方 (p. 57), 五苓散方 (p. 57), 桂苓五味甘草湯方 (pp. 58–59), 苓甘五味姜辛方 (p. 59), 茯苓五味甘草去桂加姜辛夏湯方 (p. 59), 茯苓甘草五味姜辛湯方 (p. 60), 茯苓姜味辛夏仁黃湯方 (p. 60), 栝樓瞿麥丸方 (p. 61), 茯苓戎鹽湯方 (p. 62), 猪苓湯方 (pp. 62–63), 防己茯苓湯方 (p. 67), 茵陳五苓散方 (p. 74), 猪苓散方 (p. 79), 茯苓澤瀉湯方 (p. 81), 桂枝茯苓丸方 (p. 92), 當歸芍藥散方 (p. 93), 葵子茯苓散方 (p. 94) 半夏厚朴湯方 (p. 100) and 腎氣丸方 (p. 104).

and 猪苓散方 (p. 100) (Pinyin: Zhu Ling). In Chinese, the 3 prescriptions are: 五苓散方 (p. 57), 猪苓湯方 (pp. 62–63)

⁴⁰ *Treatise on Cold-induced Febrile Diseases*, 傷寒論 (Pinyin: Shang Han Lun). In Chinese, the 9 prescriptions are: 桂枝去桂加茯苓白朮湯方 (pp. 60–61), 茯苓桂枝甘草大棗湯方 (p. 86), 茯苓桂枝白朮甘草湯方 (p. 87), 茯苓四逆湯方 (p. 88), 五苓散方 (p. 89), 茯苓甘草湯方 (p. 90), 猪苓湯方 (p. 159), 附子湯方 (p. 184), 真武湯方 (p. 189) and 麻黃升麻湯方 (p. 203).

⁴¹ In Chinese, the two prescriptions are: 五苓散方 (p. 89) and 猪苓湯方 (p. 159).

⁴² 楓柱菌 (Pinyin: Feng Zhu Jun). 楓 means maples, 柱 means wooden pillars. 楓柱菌 means the macrofungi growing on the pillars made of maples if 楓柱 really means the pillars made of maples. However, there is no relation between the supposed meaning and the hallucinogenic effect. 楓柱菌 therefore may not be understood according to the literal meaning.

⁴³ 升 (Pinyin: Sheng). It's a unit of capacity. In Zhang Zhong-jing's time, 1 Sheng=200 mL.

⁴⁴ Liquid human excrement is rich in ammonia, and ammonia water is a dissolvent for amatoxins (toxic substances produced by some toadstools), so drinking liquid human excrement would only aggregate the toxic symptom.

In contrary to the above medical works, *Classical Pharmacopoeia of the Heavenly Husbandman*⁴⁵ is more important. It was finally compiled from the material of Zhou and Qin dynasties in Han dynasty, and its authors and compilers are unknown. Six kinds of Zhi appear together for the first time in this work. They are: the Russet Zhi, the Black Zhi, the Green Zhi, the White Zhi, the Yellow Zhi and the Purple Zhi⁴⁶ (Ma, 1995, pp. 84–88). And each of them has another name accordingly: the Dan Zhi, the Xuan Zhi, the Long Zhi, the Yu Zhi, the Jing Zhi and the Mu Zhi⁴⁷. Based on the description, if a person eats each kind of them for a long time, he will become lighter in weight, never get old, live longer, and become a celestial being. Aspiring to be celestial beings is the characteristic of Taoism as a religion. I think this description was added to the work in the Qin dynasty or the Han dynasty, for Taoism had gradually developed from the philosophy to the religion in the period. Another convincing proof is the Russet Zhi increases people's wisdom. The Chinese word of wisdom is 智慧, which is translated from the Sanskrit word "Praj ā". And the translated Sanskrit words appearing in Chinese works should be no earlier than the introduction of the Buddhist scripture to China between the Western Han dynasty and the Eastern Han dynasty. With regard to the medicinal properties, the Russet Zhi is used to cure the discomfort in the chest, better the heart, keep every part of the body in balance, increase the wisdom, and prevent the decline of one's memory; the Black Zhi is used to cure discontinuously urinating, better the kidneys, refresh the patient himself, and make him become clever and get good eyesight; the Green Zhi is used to make one's eyes become bright, better the liver, set his heart at rest, and make him tolerate the others; the White Zhi is used to cure coughing and dyspnea, better the lungs, strengthen one's willpower, make the patient become brave, and comfort his soul; the Yellow Zhi is used to cure the heart and abdomen diseases, better the spleen, comfort the soul, and make the patient become credible and happy; the Purple Zhi is used to deaf, better the joints, keep the patient vigorous, improve the physique, and make him look rubicund.

Beside the medicinal properties, the tastes and the innocuous property, there is no description on their shapes, which is the most useful information for identification. Although the six kinds of Zhi were cited by many later medicinal works⁴⁸, people didn't know exactly what they were. A modern Chinese mycologist had firstly attempted to identify all of them in his paper. The result is: the Russet Zhi refers to the *Ganoderma lucidum*, the Black Zhi refers to the *Amauroderma* sp. (especially *Amauroderma rugosum*) or the *Polyporus melanopus*, the Green Zhi refers to the *Coriolus versicolor*, the White Zhi refers to the *Fomitopsis officinalis*, the Yellow Zhi refers to the *Laetiporus sulphureus*, and the Purple Zhi refers to the *Ganoderma sinense* (Zhao, 1989, pp. 180–181).

Classical Pharmacopoeia of the Heavenly Husbandman has also recorded Fu Ling (*Wolfiporia cocos*) (Ma, 1995, p. 124), Zhu Ling (*Grifola umbellata*) (Ma, 1995, p. 276) and Lei Wan (*Omphalia lapidescens*) (Ma, 1995, pp. 389–390). Each of them has another name correspondingly too: Fu Tu, Jia Zhu Shi or Lei Shi⁴⁹. Fu Ling is mainly used to cure coughing, dyspnea and fantod; Zhu Ling is mainly used to cure malaria; and Lei Wan is mainly used to

⁴⁵ *Classical Pharmacopoeia of the Heavenly Husbandman*, 神農本草經 (Pinyin: Shen Nong Ben Cao Jing).

⁴⁶ In Chinese, they are 赤芝, 黑芝, 青芝, 白芝, 黄芝 and 紫芝.

⁴⁷ In Chinese, they are 丹芝, 玄芝, 龍芝, 玉芝, 金芝 and 木芝 respectively. 丹芝=赤芝; 玄芝=黑芝; 龍芝=青芝; 玉芝=白芝; 金芝=黄芝, and 木芝=紫芝.

⁴⁸ Note for example, see Li S.Z. *The Great Pharmacopoeia* (in Chinese). Beijing: People's Medical Publishing House, 1975. P. 1711–1712.

⁴⁹ In Chinese, they are 茯菴, 猴猪屎 and 雷矢 respectively.

cure children's diseases and the stomach trouble. In addition, the work mentions the orchidaceous plant *Gastrodia elata*, whose tuber has a deep symbiosis with the *Armillariella* sp. which has a symbiosis with Zhu Ling too. *Armillariella* sp. is edible, and its mycelium can radiate fluorescence in the dark.

Classification of macrofungi

Generally speaking, ancient Chinese people regarded macrofungi as herbs. In *Literary Expositor*, the living things are classified into seven groups: the herbs, the trees, the insects, the fishes, the birds, the beasts and the livestock. The macrofungi mentioned in the work are classified into the herbs group. In *Analytical Dictionary of Characters*, except 𦵑, the characters on macrofungi all have the “艹” part in common. “艹” itself means herbs. When a character contains the “艹” part, that means the character is used to denote (a kind of) herbs. 𦵑 doesn't have the “艹” part, but its meaning “菌” has.

In *Classical Pharmacopoeia of the Heavenly Husbandman*, the six kinds of Zhi are classified into the herbs group; Fu Ling, Zhu Ling and Lei Wan are classified into the trees group. For only the sclerotia of the latter three macrofungi are used for medicinal purpose, the reason for this classification may lie in considering Zhu Ling or Lei Wan as a part of the tree roots as well. Every medicinal material in this work is classified into the high grade group, the secondary grade group or the low grade group according to its medicinal property. The six kinds of Zhi and Fu Ling are in the high grade group, Zhu Ling is in the secondary grade group, and Lei Wan is in the low grade group. In addition, the *Gastrodia elata* which has a symbiosis with *Armillariella* sp. is in the high grade group. The fact that the word 芝草 (Pinyin: Zhi Cao) appears frequently in *Discourses Weighed in the Balance* instead of 芝 also suggests Zhi was thought to be herbs, for 草 means the herbs (Huang, 1990, pp. 830-831, 840-841, 843-844).

Macrofungi in literature and an extinct work on macrofungi

In ancient Chinese literature to 220 AD, Zhi is the mostly extolled macrofungus. In the poem *Ghost of the Mountain*, Qu Yuan (340-278 BC) described the ghost as “picking San Xiu in the Wu Mountain, where rocks and kudzu vines scatter here and there”⁵⁰. According to Wang Yi's note⁵¹ on San Xiu, it's just another name of Zhi (Hong, 1983, pp. 80-81). Picking or eating Zhi was thought to be a noble act. Wang Bao⁵² used “drinking the torrential spring water in the north, and picking Zhi in the south” (Hong, 1983, p. 270) to express the high-minded character, and so did Wang Yi, who wrote the verses of “sucking the divine water to quench thirst, and eating Zhi to satisfy hunger” (Hong, 1983, p. 117). Similar descriptions exist in several pieces of Fu⁵³. Feng Yan's *Fu of Ambition*⁵⁴ contains the words of “drinking the sweet

⁵⁰ *Ghost of the Mountain*, 山鬼 (Pinyin: Shan Gui); 屈原 (Pinyin: Qu Yuan).

⁵¹ 王逸 (Pinyin: Wang Yi) is a scholar living in the Eastern Han dynasty. His commentary on *Elegies of Chu* is quite authoritative. San Xiu is 三秀 in Chinese.

⁵² 王褒 (Pinyin: Wang Bao) lived in the Western Han dynasty.

⁵³ 赋 (Pinyin: Fu) is a luxuriant literary form prevailing during the Han dynasty.

⁵⁴ 冯衍 (Pinyin: Feng Yan); *Fu of Ambition*, 显志赋 (Pinyin: Xian Zhi Fu).

spring water, and eating the vigorous Zhi" (Fan, 1973, p. 999); Sima Xiang-ru's *Fu of the Huge People*⁵⁵ contains the words of "breathing the water vapor at night and eating the sunglow in the morning, having a few beautiful flowers and chewing Zhi" (Sima, 1963, p. 3062; Ban, 1964, p. 2598); Zhang Heng's *Fu of Fantasy*⁵⁶ contains the words of "gargling with the torrential spring water, and chewing the Shi Jun <...> staying in Ying Zhou⁵⁷ and picking Zhi <...> eating the white Zhi to satisfy hunger" (Fan, 1973, pp. 1919–1930). Based on Li Xian⁵⁸'s note, Shi Jun is just Zhi. Beside Qu Yuan's poem, both the *Fu of Ambition* and the *Fu of Fantasy* mention San Xiu too (Fan, 1973, pp. 999, 1916).

When Zhi was found growing in the imperial palace in 109 BC, a short royal movement was composed to extol this phenomenon (Ban, 1964, pp. 1064–1065). The imperial palace situated in Ganquan had been considered as a sacred palace since then. I'm unable to quote the movement here in English, for it's too obscure to make itself fully understood. In 11 BC, Yang Xiong (53 BC – 18 AD) wrote the *Fu of Ganquan*⁵⁹ to satirize and expostulate the emperor's luxurious visit to the palace in the same year. It describes one scene of the visit as getting on the carriage which was decorated with the Chinese phoenix and sitting under the beautiful Zhi (Ban, 1964, pp. 3522–3524). Here Zhi is borrowed to describe the cover of the carriage, for the pileus of Zhi looks like the cover. There are two other examples of comparing the carriage cover to Zhi: the *Fu of Fantasy* contains the words of "raising the Zhi which is decorated with green dragons" (Fan, 1973, p. 1933); the carriage with three covers was called Zhi-carriage which was used to seat the emperor who intended to plough the field himself (Fan, 1973, p. 3646). Both the Zhi refer to the covers of the carriages according to the commentary. Macrofungus in literature is not always described according to its biological characteristics. For example, there is a poem containing the verses of "Zhi grow on the sandbank, swaying in the swell" (Fan, 1973, p. 2648). The fact is Zhi grow on wood, not on the sandbank or in water.

With the development of the religious aspect of Taoism in Qin and Han dynasty, Zhi was endowed with special meanings. In the *National Library Catalogue*⁶⁰, a chapter of the *History of the Former Han Dynasty*, a book in eighteen volumes is recorded, titled *The Method of Eating Zhi by Huang Emperor's Sons*⁶¹. According to Yan Shi-gu⁶²'s note, it's a book about introducing the method of eating Zhi. From the title of the book, it's easy to know that this was written

⁵⁵ *Fu of the Huge People*, 大人賦 (Pinyin: Da Ren Fu). Its author Sima Xiang-ru (Chinese: 司馬相如) was famous for his literary talent in his time. His Fu were thought to be the models of that literary style. *Fu of Huge People* was written to persuade the emperor not to zeal for meeting the celestial beings, but the emperor felt very pleased after reading it, and thought himself had almost become a celestial being traveling among the heaven and earth.

⁵⁶ *Fu of Fantasy*, 思玄賦 (Pinyin: Si Xuan Fu). Its author Zhang Heng (Chinese: 張衡, 78 AD–139 AD) was also an expert in astronomy, seismology and engineering science then.

⁵⁷ 瀛洲 (Pinyin: Ying Zhou). It was thought to be a place where the celestial beings lived.

⁵⁸ 李賢 (Pinyin: Li Xian; 653 AD–684 AD) is one of the commentators of the *History of the Later Han Dynasty*.

⁵⁹ *Fu of Ganquan*, 甘泉賦 (Pinyin: Gan Quan Fu). Beside literature, Yang Xiong (Chinese: 揚雄) was also an expert in linguistics and philosophy then.

⁶⁰ *National Library Catalogue*, 藝文志 (Pinyin: Yi Wen Zhi). It's the earliest extant catalogue of ancient Chinese book.

⁶¹ *The Method of Eating Zhi by Huang Emperor's Sons*, 黃帝雜子芝菌 (Pinyin: Huang Di Za Zi Zhi Jun).

⁶² 顏師古 (Pinyin: Yan Shi Gu; 581–645 AD). He is famous for his commentary on *History of the Former Han Dynasty*.

in the name of Huang emperor who was usually linked with Lao Zi⁶³ in the early Western Han dynasty. It's a pity that this book doesn't exist now, or else it would enable us to study on the knowledge of macrofungi in the book.

Conclusion

What we can see from the narratives above is that the naturalistic descriptions of macrofungi before the Qin dynasty evolved into the descriptions tinged with Taoist mysticism after the Qin dynasty. The best example is Zhi, which was thought to have the magical effect of keeping people immortal in the Qin dynasty and the Han dynasty. But in the period before Qin dynasty, it was described as a common organism without any supernatural effect. In this sense, Zhi can be generally used to judge a forged or anonymous ancient book whether its content was written before the Qin dynasty or after the Qin dynasty, if its content contains description of Zhi. For example, six kinds of Zhi in the *Classical Pharmacopoeia of the Heavenly Husbandman* are claimed to have the effect of making people become the celestial beings. These words could be circumstantial evidence to prove this part of the work was added after the Qin dynasty at least.

Although ancient Chinese people knew how to brew wine, they couldn't understand this was the effect of the microscopic fungus — the yeast which is too small to be seen by naked eyes. Other microscopic fungi which can be seen by naked eyes, like the mildew, cannot show their microscopic fruiting bodies clearly to people if there is not a microscope. For the microscopic fungi are difficult to observe clearly by naked eyes, they are rarely mentioned in the ancient Chinese books. My view is that among the fungi mentioned in the ancient Chinese books, macrofungi are in the majority. Ancient Chinese people to 220 AD saw macrofungi as herbs, and they had noticed the edibility and toxicity of the macrofungi. They not only ate them, but also used them as medicinal materials. Nowadays, some macrofungi, such as Fu Ling (*Wolfiporia cocos*), Zhu Ling (*Grifola umbellata*), Lei Wan (*Omphalia lapidescens*), the Russet Zhi (*Ganoderma lucidum*) and the Purple Zhi (*Ganoderma sinense*), are still used as medicinal materials. In literary works, Zhi almost became a substitute word for “nobility”. And the most interesting thing is that Mo Di had conceived applying the flag painted with macrofungi to signal communication on battlefields.

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⁶³老子 (Pinyin: Lao Zi). Lao Zi and the Huang emperor were greatly respected in the Western Han dynasty until the Han Wu Di (see ref. 72) emphasized the Confucianism on his throne.

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Знания о грибах в Древнем Китае

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В данной статье на основе древних китайских текстов проведен анализ знаний о грибах-макромицетах (macrofungi) в Древнем Китае. В том числе рассмотрены различные названия, исторически использовавшиеся для обозначения различных видов, оригинальные описания, исторические источники, содержащие сведения о грибах, их медицинских свойствах, их месте в классификации живых организмов в период до 220 г. н.э. (до конца правления династии Хань). Целесообразно отметить, что с трансформацией даосизма из философского течения в религию произошел переход от натуралистичных описаний грибов (имевших место до династии Цинь) к описаниям различных сверхъестественных свойств (показано на примере гриба Чжи). Своей основной целью настоящая статья ставит создание базиса для дальнейшего исследования с акцентом на более поздних периодах китайской истории.

Ключевые слова: макромицеты, Древний Китай, гриб Чжи, 220 г. н.э.