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REVIEW

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Advancements in the taxonomic study of myxomycetes (Myxogastrea) in China

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ABSTRACT

Species in the class Myxomycetes (or Myxogastrea) are essential components of biodiversity and play important ecological roles in terrestrial ecosystems, especially in forests. Studies on the taxonomy and diversity of these organisms started late in China. However, significant progress in China has been made in modern taxonomic studies on myxomycetes based on long-term species surveying and specimen collecting. The existing achievements have shown that comprehensive and continuous studies on the taxonomy and diversity of myxomycetes in China have the potential to enhance global biodiversity and improve the geographic distribution pattern of myxomycetes. Therefore, building on the current research foundation and expanding myxomycete research in a wider and more in-depth approach is imperative.

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1. Introduction

Plasmodial slime moulds, also referred to as acellular or true slime moulds, are considered a monophyletic taxon. In the current classification of living organisms, they are placed in the phylum Amoebozoa of the kingdom Protozoa as the class Myxomycetes or Myxogastrea (Kirk et al. 2008; Adl et al. 2019). They are a group of amoeboid eukaryotes that produce fungus-like fruiting bodies (Leontyev et al. 2019). de Bary (1859) was the first to discover some protozoan properties of such organisms, calling them Mycetozoa. Historically, several taxonomic systems of myxomycetes have followed the principles of animal taxonomy (Rostafiński 1873; Lister 1894; Hagelstein 1944; Olive 1975). However, myxomycetes also share some characteristics with fungi. Thus, they are generally studied using the same methods used for fungi and are commonly preserved together with fungi in herbaria. Literatures on myxomycetes are often present in fungus-related journals. Therefore, mycologists are the primary taxonomic researchers of myxomycetes. Consequently, these organisms have similar classification systems as fungi (Martin and Alexopoulos 1969; Farr 1976; Nannenge-Bremekamp 1991; Neubert et al. 1993, 1995, 2000; Stephenson and Stempen 1994; Lado and Pando 1997; Yamamoto 1998; Ing 2000; Li et al. 2008a, 2008b; Poulain et al. 2011), adhering to *International Code of Botanical Nomenclature* (currently, *International Code of Nomenclature for Algae, Fungi and Plants*). Rostafiński (1873) established the first classification system of myxomycetes, which is recognised as the beginning of their modern taxonomic research.

China was the first country to recognise myxomycetes. According to many international myxomycologists, the "kwei hi" recorded in ancient Chinese medical literature refers to the plasmodium of some myxomycete species. Alexopoulos (1978) thought that Twang Ching-Shih wrote the "kwei hi" (literally "demon Droppings") in the 9th century in China. This opinion was restated by Ing and Stephonsen (2022). Yamamoto (1998) further pointed out that the source of the name "kwei hi" was "*Notes on Youyang*" (an ancient Chinese medical book in about 860 AD) written by Twang Ching-Shih in the Tang Dynasty. As a result of textual research, Li (2002a) pointed out that "kwei hi" recorded by Chen Tsang-Chi in his "*Supplement to Medica*" (another ancient Chinese medical book in about 739 AD) is close to plasmodia of *Fuligo* sp., which was more than 100 years earlier than Twang Ching-Shih's "*Notes on Youyang*". Therefore, "kwei hi" represents the earliest-known Chinese record of myxomycetes, dating back to the 8th century AD, not the 9th century AD as previously believed. However, the "kwei hi" description does not

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follow any nomenclature codes or type rules. Hence, myxomycologists generally regard Panckow's (1654) description of *Lycogala epidendrum* as the world's first formal and scientific record of myxomycetes (Ing and Stephonsen 2022). In modern times, diversity investigations of myxomycetes in China started later, and systematic taxonomic studies began with the compilation of *Flora Fungorum Sinicorum: Myxomycetes* in 1973, just 50 years ago. In particular, it should be raised that the continuous taxonomic and diversity studies on myxomycetes led by Prof. Li Yu have greatly promoted the prosperity in this field of today's China. This article offers a comprehensive review of the development and the main achievements of myxomycete taxonomy in China.

2. Taxonomic studies at an early stage on myxomycetes in China

Modern studies on the taxonomy of myxomycetes began late in China. Similar to the circumstances of fungal taxonomy, early studies were primarily carried out by foreigners, who collected specimens to survey myxomycete species and their distributions. In the late 1920s, Ryodi Nakazawa of Japan published a comprehensive list, including 26 genera, 90 species, and 42 varieties of myxomycetes after identifying specimens collected by Siro Koaze et al. from Taiwan Province from 1924 to 1928. This was the earliest report on the species distribution of myxomycetes in China (Nakazawa 1929). Unfortunately, Nakazawa did not leave a record of where, or if he had, deposited those myxomycetes specimens from Taiwan Province, rendering any re-examination impossible. After Nakazawa, Skvortzow (1931) of Russia reported 32 myxomycete species from Harbin City and Mt. Maoer in Heilongjiang Province, among which there were nine new species. Zhou and Li (1978) pointed out that some of these nine new species should be regarded as doubtful; others could not be identified or could only be treated as doubtful due to specimen damage. Thus, Skvortzow's specimens are the earliest visible myxomycete specimens in China and were deposited in the Herbarium Mycologicum Academiae Sinica (HMAS). Emoto (1931, 1933, 1934, 1938) of Japan noted some myxomycete species from the current Liaoning Province and Hebei Province. Among them, *Physarum puniceum* was the first new myxomycete species found in China (Emoto 1931). The holotype of this species was collected by Kanehiko Kurita in August of 1930 at Mt. Laotie in Lvshun, Liaoning Province. Additionally, Buchet (1939) of France added a few records of myxomycete species from North China (Ing and Stephonsen 2022). However, it is a great pity that his specimens and paper have not been found in China.

The early Chinese mycologists who investigated myxomycetes were professors Shu-Qun Deng (that is Shu-Chun Teng) and Zong-Huang Zhou (that is Chung-Hwang Chow). Deng noted 10 myxomycete species from Nanjing City of Jiangsu Province in 1932 (Teng 1932), which was the first report of Chinese myxomycetes by a Chinese mycologist. Deng and his wife then reported 29 myxomycete species from Jiangsu Province, Zhejiang Province, Anhui Province, and Fujian Province in East China (Teng and Teng 1933). Later, Deng alone, and then with his wife, reported 69 myxomycete species distributed in Zhejiang, Fujian, Nanjing, Gansu, and other provinces (Teng 1934, 1947; Teng and Teng 1935, 1937). Chow (1936) published "Myxomycetes from Hsiao-Wu-Tai-Shan" and noted 22 species, and eight genera of myxomycetes collected at Mt. Xiaowutai, Hebei Province. One year later, he also published "Notes on Myxomycetes from North China" with 33 species from 17 genera (Chow 1937), including three new recorded genera and 15 new recorded species for China.

There were almost no publications on species investigation and taxonomic studies of Chinese myxomycetes from the late 1930s to the early 1960s. In 1963, Prof. Shu-Qun Deng summarised the collected specimens and expedition information and then described 124 species and 30 genera of myxomycetes in various provinces and regions of mainland China in *Fungi of China* (Deng 1963). Unfortunately, Prof. Deng passed away in 1970. More than 20 years later, the English edition of his *Fungi of China* was edited by Professor Korf and published in Deng (1996).

3. Development of taxonomic studies on Chinese myxomycetes in the past 50 years

In 1973, the Chinese Academy of Sciences (CAS) established editorial committees for *Flora of China*, *Fauna of China*, and *Cryptogamic Flora of China* in Guangzhou. Prof. Zhou Zong-Huang was appointed by the CAS as deputy chief editor of *Flora Fungorum*

Sinicorum, a sub-flora of *Cryptogamic Flora of China*. At this meeting, *Flora Fungorum Sinicorum: Myxomycetes* was approved as one of the first researched and compiled volumes of *Flora Fungorum Sinicorum*, marking the beginning of a new development era of the taxonomic study of Chinese myxomycetes. In 1978, Prof. Zhou initiated taxonomic studies on fungi and myxomycetes at Jilin Agricultural University through the enrolment of postgraduate students in microbiology, including Prof. Li Yu. Li's dissertation at the time, titled "Taxonomic Study on Cribrariaceae in China", was a unique item therein involving the taxonomy of myxomycetes. In the same year, Prof. Zhou (1981) authored an article titled "The taxonomic problem of slime molds", which highlighted the importance of systematics studies on myxomycetes and its relevance to the phylogenetic study of organisms. The death of Prof. Zhou (1981) caused a considerable and unlucky loss to modern taxonomic studies on myxomycetes in China. However, the study was carried forward by Prof. Li Yu, who continues to research the taxonomy of myxomycetes at Jilin Agricultural University after he received his Master of Science degree from the CAS in Liu (1981), effectively developing myxomycete taxonomy in China.

Prof. Yu Li led his students in collecting specimens from various parts of China through persistent and exhausting field expeditions. He explored and unveiled the diversity and distribution of myxomycete species in China. In 1983, he collated the specimen previously studied with Zhou and described a new species of myxomycetes named *Cribraria enodis* (Zhou and Li 1983), which stands as the first new myxomycete species discovered and named by Chinese mycologists. During the same year, Li also notified eight newly reported species of *Cribraria* for China (Li 1983). Based on the results of about 20 years of specimen collection and identification throughout China, an article on the species list of Chinese myxomycetes and their distributions was published in 1989 in the journal *Mycotaxon* by Li and Li (1989). This was the primary instance where a Chinese mycologist's article on myxomycetes was presented in an overseas academic periodical. Its inclusion offered overall and valuable information about the distribution of myxomycete species in China to international myxomycete taxonomists. Prof. Li Yu presided over the publication of 13 new species of myxomycetes from 1989 to 1996 in the journal *Mycosystema*, the annual report of the CAS's Systematic Mycology & Lichenology Laboratory (Li et al. 1989, 1992, 1992, 1993, 1993, 1996; Liu 1990; Li and Li 1990, 1994; Wang et al. 1996). *Liceales in China* by Prof. Li (2005), stood as the maiden written English monograph on a single taxon of myxomycetes from China. In this monograph, following the classification system of Martin et al. (1983), Prof. Li divided Liceales into three families: Liceaceae, Enteridiaceae, and Cribrariaceae. It entailed a record of 58 species, eight genera, and three families of Liceales from China. Moreover, the classification system consolidated *Dictydiaethalium*, *Lycogala*, and *Tubifera*, merging them into Enteridiaceae instead of previously holding them in distinct families. In 2008, Prof. Li, as editor-in-chief, took charge of publishing the two-volume compilation titled *Flora Fungorum Sinicorum: Myxomycetes*. The monograph detailed the description and illustration of 6 orders, 11 families, 44 genera, and 299 species of myxomycetes from China according to the classification system of Martin et al. (1983).

Since the 1980s, there have been other domestic mycologists investigating and studying myxomycetes in China. Liu (1980) began to report on myxomycetes in Taiwan Province in the 1980s. Firstly, she described 15 myxomycete species in 1980 that mainly occurred on the woody cultivation materials of *Letinula edodes*, and then added seven species in 1981 (Liu 1981). After that, alone or with her co-authors, she reported continuously on myxomycetes in Taiwan Province (Liu 1982, 1983, 1989, 1990; Liu and Chung 1993; Liu and Chen 1998a, 1998b, 1999; Liu et al. 2001, 2002, 2002, 2002, 2006, 2006, 2007, 2011; Liu and Chang 2007, 2011). CAS organised several scientific investigations in the 1980s and 1990s, resulting in the collection and documentation of some myxomycete species. Zhou and Li (1983) described 12 species and one variety of seven genera in *Fungi of Tibet*. Mao and Wen (1985) described eight species of seven genera in the *Fauna and Flora of the Mt. Tuomuer Region in the Tianshan Mountains*. Zang et al. (1996) described 29 species of 15 genera in *Fungi of the Hengduan Mountains*. Li and Li (1997) described 68 species of 20 genera in *Fungi of the Xiaowutai Mountains in Hebei Province*. Along with the Mycological and Lichenological Expedition to Shennongjia of CAS, Li collected myxomycete specimens in Shennongjia, Hubei Province, from July to September of 1984. She described *Diachea synspora* (a synonym of current

D. koazei) as a new species (Li 1988). Then she reported 89 myxomycete species of 29 genera in 10 families from Shennongjia, including two new species, *Badhamia macrospora* and *Badhamiopsis nucleata* (Li 1989). Chung and Liu (1995) reported fimicolous myxomycetes for the first time in Taiwan Province. Later, two papers on the taxonomy of myxomycetes in Taiwan Province were published by Chung and Liu (1997, 1998). Chung (1997) also reported on 58 species and two varieties of 24 genera of myxomycetes in Hong Kong, including a new species: *Physarum hongkongense*. In the same year, Chung et al. (1997) reported 10 species of nine genera of myxomycetes in Macau.

Among foreigners, Champion and Mitchell (1980) reported 10 species of eight genera of myxomycetes in Hong Kong. Ing (1987) reported 24 species of 11 genera of myxomycetes collected from Hong Kong and Guangdong Province. Yamamoto et al. (2000, 2002) reported 81 species of 24 genera of myxomycetes from Yunnan Province, among which, *Perichaena verrucifera* and *Physarum ovisporoides* were new species, another 30 species of myxomycetes were newly recorded for China. Ukkola et al. (2001) and Härkönen et al. (2004, 2004) reported 124 species of myxomycetes belonging to 28 genera in Hunan Province, among which six species were newly recorded for China. Schnittler et al. (2013) reported 80 myxomycete species from the northern Tarim Basin and eastern Tianshan Mountains of Xinjiang Uygur Autonomous Region, including 53 species collected in the field and 32 species harvested in the moist chamber culture, based on the taxonomic study of 206 specimens collected in the field and 362 substrate culture materials, among which two genera *Kelleromyxa* and *Protophysarum* were firstly recorded in China.

4. Major accomplishments of taxonomic studies on myxomycetes in China in the past 40 years

In the last 40 years, dozens of new species of myxomycetes from China have been discovered, named, and described. Currently, An Online Nomenclatural Information System of Eumycezotozoa (Lado 2023) accepts 62 species described from China. These are: *Arcyria aeruginosa* (Gao et al. 2018), *A. aggregata* (Li et al. 1993), *A. exigua* (Li et al. 1993), *A. galericulata* (Zhang et al. 2012), *A. gongyloida* (Wang and Li 1996), *Badhamia formosana* (Liu et al. 2002), *B. macrospora* (Li 1989), *Badhamiopsis nucleata* (Li 1989), *Calonema gansuense* (Zhang and Li 2015), *Comatricha clavicolumella* (Zhang and Li 2016b), *C. macrospora* (Zhang et al. 2018), *C. nutans* (Chen 1999), *Craterium corniculatum* (Zhang and Li 2013a), *Cr. microcarpum* (Li et al. 1993), *Cr. subpurpurea* (Zhang et al. 2020), *Cr. yichunense* (Zhao et al. 2018), *Cribraria angulospora* (Liu and Chang 2007), *Cri. enodis* (Zhou and Li 1983), *Cri. irregularis* (Li 2002b), *Cri. media* (Li and Li 1995), *Cri. paucidictyon* (Li 2002b), *Diacheopsis gigantospora* (Yan et al. 2014), *D. griseobrunnea* (Yan et al. 2014), *Dianema macrosporum* (Zhang and Li 2013b), *Di. microsporangium* (Li and Li 1990), *Dictydiaethalium dictyosporangium* (Zhang and Li 2014), *Diderma liaoningensis* (Zhao et al. 2022), *Did. subochraceum* (Gao et al. 2018), *Did. verrucocapillitia* (Zhao et al. 2022), *Didymium pseudocolumellum* (Li et al. 1996), *Didy. yulii* (Zhao et al. 2021), *Hemitrichia heterospora* (Wang and Li 1995), *Licea pescadorensis* (Chung and Liu 1996a), *L. reticulospora* (Li and Li 1994), *Oligonema oedonema* (Li et al. 1992), *Perichaena frustrifilaris* (Wang et al. 2000), *P. grisea* (Wang et al. 2000), *P. membranacea* (Li et al. 1990), *P. papulosa* (Liu et al. 2007), *P. poronema* (Li et al. 1990), *P. verrucifera* (Yamamoto et al. 2002), *Physarum annulipes* (Chen and Li 1998), *Ph. aurantiacum* (Chen et al. 1999), *Ph. badhamioides* (Chen and Li 2000), *Ph. caesium* (currently *Ph. caesiellum*) (Chen and Li 1998; Chung and Tzean 2000), *Ph. confusum* (Chen and Li 2000), *Ph. cremiluteum* (Liu and Chen 1998b), *Ph. deformans* (Chen and Li 2000), *Ph. herbaticum* (Chen and Li 2000), *Ph. hongkongense* (Chung 1997), *Ph. loratum* (Chen et al. 1999), *Ph. obpyriforme* (Liu and Chen 1998b), *Ph. ovisporoides* (Yamamoto et al. 2002), *Ph. taiwanianum* (Chung and Liu 1996b), *Ph. xylophilum* (Chen and Li 1998), *Stemonaria liaoningensis* (Zhang and Li 2012), *Stemonitis plana* (Zhang and Li 2017), *S. sichuanensis* (Zhang and Li 2016c), *Trichia heteroelaterum* (Li et al. 1989), *T. ramosa* (currently *Trichia huizhongii*) (Li et al. 1992; Chung and Tzean 2000), *T. macrospora* (Zhang and Li 2016a), *T. microspora* (Li et al. 1989).

Concurrently, as numerous newly recorded species for China were found and reported, the known number of myxomycete species in China has been constantly increasing since 1983. Thereby, the knowledge of distribution patterns of myxomycete species in China and the world is greatly improved. Thus, 142 and 224 species of myxomycetes from China were

documented respectively in *Fungi in China* (Deng 1963) and "A Checklist of Myxomycetes from China" (Li and Li 1989). Two hundred and ninety-nine myxomycete species were described and illustrated in *Flora Fungorum Sinicorum: Myxomycetes* (Li et al. 2008a, 2008b), and then 457 myxomycete species were noted in Species 2000 China Noda (http://www.sp2000.org.cn/) (Yao et al. 2022). Moreover, the distribution of myxomycetes has been reported from all 34 provinces, municipalities, autonomous regions, and special administrative regions of China.

Numerous new recorded genera of myxomycetes for China have also been reported since 1983. The following genera have been discovered and added to the China inventory: *Arcyodes* (Zhang and Li 2013c), *Calomyxa* (Liu 1983, Chen etal. 1999; Yamamoto et al. 2002), *Calonema* (Zhang and Li 2015), *Colloderma* (Ukkola et al. 2001), *Cornuvia* (Song et al. 2022), *Diacheopsis* (Yamamoto et al. 2002), *Dianema* (Li and Li 1990), *Elaeomyxa* (Zhang and Li 2017), *Kelleromyxa* (Schnittler et al. 2013), *Lepidoderma* (Li 1989), *Macbrideola* (Liu 1983; Ukkola et al. 2001), *Oligonema* (Li et al. 1992), *Protophysarum* (Schnittler et al. 2013), *Trabrooksia* (Liu and Chang 2011). In addition, some species have changed their taxonomic status, so their transferred genera or newly established genera have also been recorded in China, such as *Collaria* (Deng 1963), *Gulielmina* (Liu 1982; Li and; Li 1989; Li et al. 2008a), *Licaethalium* (Zhu et al. 2012), *Meriderma* (Gao et al. 2019), *Ophiotheca* (Deng 1963; Ing 1987), *Paradiachea* (Li and Li 1989), *Paradiacheopsis* (Ing 1987; Ukkola et al. 2001; Li et al. 2008b), *Siphoptychium* (Li and Li 1989; Li et al. 2008a), *Stemonaria* (Deng 1963; Li et al. 2008b), *Stemonitopsis* (Deng 1963; Härkönen et al. 2004; Li et al. 2008b), *Symphytocarpus* (Nakazawa 1929; Emoto 1931; Li 1989; Härkönen et al. 2004; Li et al. 2008b), *Thecotubifera* (Li et al. 2004), *Willkommlangea* (Deng 1963; Chung and Liu 1997; Li et al. 2008b). Thus, of the 70 genera of myxomycetes recognised internationally, 60 are known to China.

Recent taxonomic studies and long-term investigations have significantly enhanced our understanding of the species diversity of myxomycetes in China and their correlation with environmental factors. There has been an increasing focus on the composition and distribution of species diversity. The systematic studies in this field are primarily focused on central China, positioned in the northern subtropics and recognised for its more extensive species diversity. Gao et al. (2018) conducted a study at Baotianman Nature Reserve in Henan Province and found that the community of bark-living myxomycetes was closely correlated with forest types, while the community of litter-living myxomycetes exhibited seasonal changes influenced mainly by climate factors. Li et al. (2021) carried out research at Tiantangzhai National Forest Park in Anhui Province and demonstrated that bark-dwelling myxomycetes had a higher diversity than litter-dwelling myxomycetes. Furthermore, the main factors affecting species diversity of bark-dwelling myxomycetes were vegetation, pH, water capacity, and altitude, while forest type played a crucial role in determining the community structure of bark-dwelling myxomycetes. Additionally, Li et al. (2021) conducted a study at Houhe Nature Reserve in Hubei Province and showed that species richness and diversity of myxomycetes in litter varied significantly between months and were greatly influenced by climatic factors. Based on the above studies, Li et al. (2022) confirmed that there were higher species richness and diversity of myxomycetes in mixed broad-leaved and coniferous forests than those in broad-leaved and coniferous forests in Tiantangzhai of Dabie Mountains, Baotianman of Qinling Mountains, Houhe of Wuling Mountains, and Shennongjia of Daba Mountains. In all the sites and forest types, differences in myxomycete communities among different substrates were observed. The influence of geographical isolation on the community of myxomycetes was greater than that of forest types, as locale played a higher factor in the variation. In addition, Gao et al. (2019) researched myxomycete communities in forest soil using a high-throughput sequencing technique at Baotianman Nature Reserve in Henan Province. They concluded that forest type was the most important factor affecting the composition of myxomycete communities in soil, besides soil C/N and pH. There were significant differences in community diversity and structure of myxomycetes among different forest types, with no significant changes in the community during different seasons. Furthermore, they researched the spatial patterns of microbial communities, including myxomycetes, bacteria, and fungi, in the soil from eight sampling areas of Chinese subtropical forests located in Fujian Province, Jiangxi Province, and Hunan Province. The results revealed a significant range-

decay relationship between the three microbial communities, with the consistency of myxomycetes and fungi communities being higher than myxomycetes and bacteria. Gao et al. (2022) suggested that deterministic processes mostly affect the assembly of myxomycetes and fungi communities, while random processes mainly affect the assembly of bacterial communities. Rao et al. (2023) studied the assembly mechanism and interaction of myxomycetes, bacteria, and fungi in the soil of bright coniferous forests in China's cold temperate zone. The results show that different microorganisms exhibit unique evolutionary and assembly patterns in phylogenetic groups. Myxomycetes and fungi are mainly affected by stochastic diffusion restriction and drift, while bacteria are mainly affected by stochastic drift and deterministic homogenous selection.

From 6 to 11 September 1993, the 1st International Congress on Systematics and Ecology of Myxomycetes (ICSEM) was held in Chester, U.K. Prof. Li Yu presented a report titled "Sixty Years of Research on Myxomycetes in China" to the Congress, which covered the research development of myxomycete taxonomy in China from 1929 to 1993. Since then, he has actively promoted academic exchange and scientific cooperation between China and foreign countries in the field of myxomycete taxonomy. In 2014, the 8th International Congress on Systematics and Ecology of Myxomycetes successfully took place through Prof. Yu Li's efforts at Jilin Agricultural University, Changchun, China. Taxonomists and ecologists worldwide made an academic exchange at ICSEM, which was held in China and Asia for the first time. As the chairman of this conference, Prof. Li Yu delivered a concluding speech titled "Myxomycology: A Challenging and Inspirational Field". Profs. Li Yu and Indira Kalyanasundaram received the "Outstanding Achievement Award" from the organising committee of the conference for their significant contributions to myxomycete research.

Now, the number of known myxomycete species in China is nearly 500, an increase of over 350 compared to 142 species noted by Deng (1963) 60 years ago. This species number accounts for nearly half of about 1100 myxomycetes species known worldwide (Lado 2023). China has a vast territory, abundant resources, and varied ecological environments, so it should contain more abundant species diversity of myxomycetes. The understanding of myxomycete diversity over the past 60 years has significantly developed with extensive and continuous species investigations and specimen collections in China. However, it is also strongly suggested that there is great potential for taxonomic and diversity studies on myxomycetes in China. There is still considerable work to be done. More extensive and intensive taxonomic studies on myxomycetes will be crucial in furthering our understanding of the diversity of myxomycetes in the world.

5. Conclusion

In conclusion, this study highlights the importance of taxonomic and diversity research on myxomycetes, also known as Myxogastrea, in China. While studies on these organisms started later compared to other regions, significant progress has been made through modern taxonomic approaches, long-term surveys, and specimen collection. The achievements in myxomycete research in China have demonstrated the potential for enhancing global biodiversity knowledge and improving understanding of the geographical distribution patterns of these species.

By conducting comprehensive and continuous studies on the taxonomy and diversity of myxomycetes, researchers can contribute to the conservation and management of terrestrial ecosystems, particularly forests. The ecological roles of myxomycetes play a crucial part in these ecosystems, and expanding research in this area can provide valuable insights into their functions and interactions. To further advance the field, building upon the existing research foundation in China and adopting a more comprehensive approach is crucial. This entails conducting further species surveys, comprehensive morphological and molecular studies, and investigating myxomycetes' ecological characteristics and habitat preferences. Expanding our understanding of myxomycetes in China can make valuable contributions to global biodiversity conservation efforts and facilitate informed decision-making in ecosystem management.

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