Ingoldian fungi In Hong Kong

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A discussion on Ingoldian fungi is provided. The Ingoldian fungi known from Hong Kong are listed and a key for their identification is provided. Most of the fungi are illustrated and it is hoped that the paper will be a basis for the study of Ingoldian fungi in Hong Kong, at the student level.

Key words: hyphomycetes, Ingoldian fungi.

Introduction

Freshwater hyphomycetes are often classified as those fungi which for part of their life cycle, or the whole of their life cycle, occur in freshwater environments. This definition, is however, quite vague as it includes all fungi that may be present in the freshwater ecosystem, regardless of their origins.

Freshwater hyphomycetes can be classified into four ecological groups based on sporulation methods and mycelial growth. This gives a clearer definition of different freshwater fungal groups. The four ecological groups include the aero-aquatic hyphomycetes, terrestrial-aquatic hyphomycetes, submerged-aquatic (amphibious) hyphomycetes and Ingoldian fungi. Ingoldian fungi, which were the target group of this study, are classified as those fungal species actively growing and sporulating under water. They occur mostly on plant litter, and leaves in rivers or streams (Bärlocher, 1992). However, the grouping of these different kinds of freshwater hyphomycetes is quite arbitrary and some species overlap between the definitions. Ingoldian fungi were named in honor of C.T. Ingold, the "father" of this group of fungi, who was the mycologist to discover the typical habitat of these fungi (Iqbal, 1994).

Habitat

Ingoldian fungi are found in freshwater environments, mainly in rapidly flowing and turbulent water. The apparent preference for fast running, wellaerated and non-polluted streams, indicates that they cannot tolerate low oxygen levels (Bärlocher, 1992). The majority of Ingoldian fungi are found in streams and rivers, but some have also been reported from lakes and terrestrial habitats. They are saprotrophs and occur on almost any type of plant debris and are indeed most common on deciduous leaves, but they also colonize conifer twigs and needles. They also grow on submerged macrophytes and as endophytes in healthy roots of riparian trees (Bärlocher, 1992).

Role in food web

Interest in Ingoldian fungi was increased by the studies by Kaushik and Hynes (1971), who found that autumn-shed leaves were an important food source for invertebrates in streams. The leaves undergo a process of microbial degradation, in which Ingoldian fungi play an important role. The microbial degradation makes the plant litter more palatable and nutritious to leaf shredders (Suberkropp and Klug, 1976; Bärlocher, 1992). These authors therefore established that Ingoldian fungi are intimately involved in the energy flow in streams. Fungi are decomposers, which have been shown to produce a rich array of enzymes active towards the major leaf polysaccharides (Suberkropp and Klug, 1980; Chamier, 1985; Suberkropp, 1991a), making the energy from shredded leaves accessible to the community. Energy flows and development of communities in freshwater ecosystems are largely dependent on the supply of allochthonous material, the majority of which is leaf litter from adjacent terrestrial environments (Bärlocher and Kendrick, 1976). The riparian vegetation therefore forms a close relationship with the stream ecosystem. Many previous studies of fungi in streams have focused on their role in the energy flow and trophic dynamics of such detritus-based food chains (Suberkropp, 1992).

Adaptation

Ingoldian fungi have a large variety of conidial shapes that include tetraradiate, branched or filiform. The most frequently observed spore conidial shape are tetraradiate. The function of this conidial shape in aquatic hyphomycetes is to minimize downstream transport (Webster, 1959). When a tetraradiate spore makes contact with a surface it does so at three points and the spore acts as a tripod, which represent a very stable form of attachment. Germination of Ingoldian fungi requires a contact stimulus and upon settling, the spore germinates to form a pad or appressorium, which further strengthens adhesion to surfaces (Webster, 1959). This mechanism may explain why Ingoldian fungi are successful colonizers on submerged plant material. Another explanation for the abundance of the tetraradiate shape is that the shape might facilitate the dispersal in aqueous films, between layers of terrestrial leaf litter (Bandoni, 1975).

The second most common conidial shape typical of hyphomycetes is sigmoid, a configuration which also aids attachment (Webster and Davey, 1984; Webster, 1987). Sigmoid spores in a slow moving current tend to role along the bottom, and conidial ends can make contact with surface (Webster and Davey, 1984), which enhance the chance of colonizing the substratum. The two dominant conidial shapes of aquatic hyphomycetes increase their probability of encountering a target (Cox, 1983) and hence facilitate attachment.

Biodiversity

In his first report, Ingold (1942) described 16 species of Ingoldian fungi, 10 of which were new, marking the starting point of a "minor mycological industry" (Ainsworth, 1976). Later, over 150 species were described and many more await description (Webster and Descals, 1981). In the recent report, approximately 300 species of Ingoldian fungi were thought to have been described, most from temperate regions (Goh, 1997). This number is still increasing.

Geographical distribution

Ingoldian fungi exhibit morphological (Webster, 1959) and physiological adaptations (Suberkropp and Klug, 1981) for plant litter degradation in flowing water. Their conidia have been reported from a variety of habitats and geographical locations (Webster and Descal, 1981, Wood-Eggenschwiler and Bärlocher, 1983). They are cosmopolitan in their distribution, extending from the arctic Circle to the equator (Kobayasi *et al.*, 1967, 1971; Muller-Haeckel and Marvanova, 1976, 1979; Webster and Descals, 1981; Engblom *et al.*, 1986; Bhat and Chien, 1990). Geographic occurrences of fungi are broadly correlated with optimal temperature for in vitro growth and sporulation (Bärlocher, 1992). Abundance and biodiversity of Ingoldian fungi vary in different temperature zones. Most known Ingoldian fungi have been described from temperate regions, many tropical species are still unexplored.

Seasonal distribution

The concentration of conidia in stream water in temperate regions, has been shown to be influenced by seasonal changes in leaf fall from riparian vegetation (Iqbal and Webster, 1973, 1977). This seasonal influence on the occurrence of aquatic hyphomycete is more likely to be mediated through the availability of fresh supply of autumn-shed leaves. The more leaves are available for colonization, then the more conidia are found. A study found that most species in England were more common from late summer to early winter than during the rest of the year (Ingold, 1942). In this period, there is an enormous amount of fallen leaves during autumn, and hence the concentration of conidia peaks.

Influence of riparian vegetation-type

The occurrence and concentration of conidia and the species composition of fungal communities not only vary with season, but also vary with the types of riparian vegetation in different streams. Streams with similar physical characteristics differ in their ecology according to the riparian vegetation. It is well established that changes in the riparian flora often coincide with changes in the aquatic hyphomycete community (Gönczöl, 1975, 1987, 1989; Bärlocher, 1982; Wood-Eggenschwiler and Bärlocher, 1983; Thomas *et al.*, 1989). When leaves of different species are collected from the same stream section, dominance patterns in the fungal communities of the leaves usually differ (Gönczöl, 1975, 1989; Suberkropp and Klug, 1976; Chamier and Dixon, 1982; Bengtsson, 1983; Rossi *et al.*, 1983; Shearer and Lane, 1983; Sridhar and Kaveriappa, 1988, 1989). It can be concluded that riparian vegetation-type plays an important role in determining the community composition of Ingoldian fungi in the stream.

Influence of water chemistry

Au (1992) studied the influence of physical-chemical factors on the ability of aquatic hyphomycetes to compete with other organisms for plant litter decomposition. She found that among water temperature, dissolved oxygen, biological oxygen demand, pH, turbidity, oxygen availability would probably be the major factors, since well-oxygenated water is required for growth and sporulation of aquatic hyphomycetes (Nilsson, 1964; Webster, 1975).

Dispersal

Since Ingoldian fungi do not have motile conidia, they are dispersed in water currents. Apart from having independent conidia, Ingoldian fungi can also attach to substrate during their dispersal. They can travel downstream by means of mycelium embedded in leaf tissue or wood submerged in the stream. Other dispersal mechanisms include animals, mycelium may attach to the feet of waterfowl (Bärlocher, 1992) or aquatic invertebrates, which may transport them to other areas. Asexual spore of aquatic fungi are generally too fragile for long-range dispersal, while sexually produced spores are often airborne and allow long distance dispersal (Bärlocher, 1992). This may help to explain the paradox of the worldwide distribution of freshwater fungi with passively dispersed conidia.

Table 1. List of Ingoldian fungi found in Hong Kong from different studies.

Name	References
Alatospora acuminata Ingold	Chan *et al.*, 2000
Alatospora pulchella Marvanova	Au *et al.*, 1992
Anguillospora crassa Ingold	Chan *et al.*, 2000
Anguillospora gigantea Ranzoni	Chan *et al.*, 2000; Tsui *et al.*, 2000
Anguillospora longissima Ingold	Chan *et al.*, 2000
Anguillospora pseudolongissima Ranzoni	Chan *et al.*, 2000
Articulospora moniliforma Ranzoni	Au *et al.*, 1992
Articulospora tetracladia Ingold	Au *et al.*, 1992; Chan *et al.*, 2000
Beltrania rhombica Penzig	Chan *et al.*, 2000
Brachiosphaera tropicalis Nawawi	Ho, 1998; Chan *et al.*, 2000; Tsui *et al.*, 2000
Calcarispora hiemalis Marvanova and Marvan	Au *et al.*, 1992
Camposporium antennatum Harkness	Chan *et al.*, 2000
Campylospora filicladia Nawawi	Chan *et al.*, 2000
Campylospora spp.	Chan *et al.*, 2000
Centrospora aquatica Iqbal	Au *et al.*, 1992
Clavariana aquatica Nawawi	Chan *et al.*, 2000
Clavariopsis aquatica De Wildeman	Au *et al.*, 1992
Clavariopsis brachycladia Tubaki	Chan *et al.*, 2000
Clavarispora spp.	Au *et al.*, 1992
Clavatospora longibrachiata Nilsson	Chan *et al.*, 2000
Clavatospora tentacula Nilsson	Chan *et al.*, 2000
Condylospora spumigena Nawawi	Chan *et al.*, 2000
Dendrospora fusca Descals and Webster	Au *et al.*, 1992
Dicranidion gracile Matsush.	Chan *et al.*, 2000
Diplocladiella scalaroides Arnaud apud Ellis	Ho, 1998; Chan *et al.*, 2000
Flabellospora acuminata Descals and Webster	Chan *et al.*, 2000
Flabellospora crassa Alasoadura	Chan *et al.*, 2000
Flabellospora spp.	Chan *et al.*, 2000
Flabellospora verticillata Alasoadura	Chan *et al.*, 2000
Flagellospora curvula Ingold	Au *et al.*, 1992; Chan *et al.*, 2000
Flagellospora penicilliodes Ingold	Au *et al.*, 1992
Helicomyces colligatus Moore	Chan *et al.*, 2000
Helicomyces spp.	Chan *et al.*, 2000
Helicomyces torquatus Lane and Shearer	Chan *et al.*, 2000
Isthmolongispora spp.	Chan *et al.*, 2000
Isthmotricladia gombakiensis Nawawi	Chan *et al.*, 2000
Lemonniera aquatica De Wildeman	Chan *et al.*, 2000
Lemonniera spp.	Au *et al.*, 1992; Chan *et al.*, 2000
Lunulospora curvala Ingold	Au *et al.*, 1992
Lunulospora cymbiformis Miura	Au *et al.*, 1992; Chan *et al.*, 2000
Mycocentrospora filiformis Iqbal	Au *et al.*, 1992

Table 1. (continued).

Name	References
Nawawia filiformis (Nawawi) Marvanová	Ho, 1998
Pseudoanguillospora stricta Iqbal	Au *et al*., 1992
Pyramidospora fluminea Miura and Kudo	Au *et al*., 1992
Scutisporus brunneus Ando and Tubaki	Chan *et al*., 2000
Sigmoidea aurantiaca Descals	Au *et al*., 1992
Subulispora procurvata Tubaki and Yokohama	Chan *et al*., 2000
Tetrachaetum elegans Ingold	Au *et al*., 1992
Tetracladium marchalianum De Wildeman	Chan *et al*., 2000
Tetracladium setigerum Ingold	Chan *et al*., 2000
Tricladim spp.	Chan *et al*., 2000
Tricladium attenuatum Iqbal	Au *et al*., 1992; Tsui *et al*., 2000
Tricladium indicum Sati rt N. Tiwari	Ho, 1998
Tripospermum porosporiferum Matsush.	Chan *et al*., 2000
Triscelophorus acuminatus Nawawi	Au *et al*., 1992; Chan *et al*., 2000
Triscelophorus magnificus Petersen	Chan *et al*., 2000
Triscelophorus monosporus Ingold	Au *et al*., 1992; Chan *et al*., 2000
Triscelophorus ponapensis Matsush.	Chan *et al*., 2000
Triscelophorus spp.	Au *et al*., 1992
Varicosporium delicatum Ingold	Au *et al*., 1992

Ingoldian fungi in Hong Kong

Studies of Ingoldian fungi have been carried out in many countries, mostly in temperate regions. In Hong Kong, 387 species of freshwater water fungi have been identified (Lu *et al*., 2000). Previous studies of Ingoldian fungi in Hong Kong were carried out by comparing the biodiversity found on specific leaf types in the polluted Lam Tsuen River and the unpolluted Tai Po Kau Forest Stream (Au *et al*., 1992). Twenty-five aquatic hyphomycetes species were found and most of them were cosmopolitian or frequently reported in temperate regions. In other separate studies, Chan *et al*. (2000) reported 41 species, Tsui *et al.* (2000) reported 3 species and Ho (1998) reported 4 species from Hong Kong. A total of 51 species of Ingoldian fungi known from Hong Kong from several studies are lised in Table 1 and a key is provided below.

Key to the identified species found in Lam Tsuen River and Tai Po Kau Forest Stream in Hong Kong

1. Conidia tetraradiate..2
1. Conidia sigmoid..3
1. Conidia with other shapes..4

2. Conidia hyaline..5
2. Conidia brown..6

3. Conidia unicellular... *Flagellospora curvula* (Fig. 27)
3. Conidia with 2 or more cells...7

4. Conidia hyaline...8
4. Conidia brown 9

5. Conidia septate 10
5. Conidia non-septate 11

6. Conidia with 4-8 appendages slightly constricted at origin, much longer than 1.5 times diam. of central part; central part globose to pyramidal . *Brachiosphaera tropicalis* (Fig. 8)
6. Conidia consisting of a clavate central body (triangular in outline), 5-8 µm wide at base, 24-33 µm wide above (crowned portion), and with 4, 0-3 septate, 53-160 µm long appendages, 3-5 µm at widest point, tapering to 2-2.5 µm towards their ends; appendages septate but not constricted at their base .... *Clavariana aquatica* (Fig. 19)

7. Conidia filiform, not wider than 8 µm 12
7. Conidia wider than 8 µm in the middle, vermiform, with septum in middle .... *Anguillospora crassa* (Fig. 3)

8. Conidia coiled 13
8. Conidia uncoiled 14

9. Conidia consisting of a biconic, symmetrical main axis, with a distinct, hyaline, transverse band .... *Beltrania rhombica* (Fig. 10)
9. Conidia not consisting of a biconic, symmetrical main axis..15

10. Main axis clavate, truncate at apex, with non-septate appendages .... *Clavatospora longibrachiata* (Fig. 14)
10. Main axis not clavate 16

11. Conidia with spherical main axial cell...17
11. Conidia without spherical main axial cell..18

12. Conidia bicelled, not longer than 60 µm.................... *Flagellospora penicilliodes* (Fig. 49)
12. Conidia with more than 2 cells 19

13. Secondary conidia usually formed, patellate end of filament without flattened detachment scar.. *Helicomyces colligatus* (Fig. 29)
13. Secondary conidia rarely formed, with flattened detachment scar...................................... .... *Helicomyces torquatus* (Fig. 30)

14. Conidia branched 20
14. Conidia unbranched 21

15. Conidia with filiform appendages 22
15. Conidia without filiform appendages 23

16. Conidia consisting of a main axis widening at apex, where there is an oval to spherical central knob, appendage with apical cell rounded, forming an eccentric knob .... *Tetracladium marchalianum* (Fig. 35)

16. Conidia without central knob or eccentric knob 24

17. Conidia with 3-5 (mostly 4) appendages, which are obclavate, 3-9-septate (mostly 5), 35-56 μm long, 3-3.5 μm wide at apex, 5.5-7.5 μm at widest point. Main axis 5-15 × 2-3 μm, with a 5-7 μm wide terminal swelling .... *Flabellospora crassa* (Figs. 20-21)
17. Conidia with 4 divergent appendages, which are 25-120 × 2-5 μm, 1-3 septate, uniform in width. One of the appendages longer than the others ....*Lemonniera aquatica* (Fig. 31)

18. Conidial appendages rhomboid, obpyramidal, or obclavate 25
18. Conidial appendages not rhomboid, obpyramidal or obclavate 26

19. Conidia with a basal filiform or falcate appendage, 5-35 × 1-2 μm, uniform width throughout its length .... *Mycocentrospora filiformis* (Fig. 50)
19. Conidia with a basal filiform or falcate appendage, 75-125 × 2.5-30 μm, tapering slightly towards the apex .... *Centrospora aquatica* (Fig. 46)
19. Conidia without a basal filiform or falcate appendage 27

20. Condia multiradiate (with more than 4 appendages) 28
20. Conidia not multiradiate 29

21. Conidia sickle-shape 30
21. Conidia not sickle-shape 31

22. Conidia consisting a cylindrical main axis and 2 subapical appendages ....
.... *Camposporium antennatum* (Fig. 9)
22. Conidia not consisting a cylindrical main axis 32

23. Conidia with 4-6 cylindrical or obclavate appendages with rounded apices, diverging at right angles to the main axis .... *Dendrospora fusca* (Fig. 48)
23. Conidia consisting of a main axis bent back on itself at about one third of its length, and 2-3 divergent appendages, shorter part of axis 2-celled, with one appendage; longer part of axis 3-5 celled, with 1-2 appendages .... *Tripospermum porosporiferum* (Fig. 32)

24. Conidia with axis rarely cylindrical, proximal part from cylindrical to narrowly clavate, distal part narrow-cymbiform .... *Alatospora pulchella* (Fig. 42)
24. Conidia with axis cylindrical 33

25. Conidia consisting of an obconical, 2 celled axis, and 3-4 romme appendages, either conic or obconical, much wider at base than at apex.............*Clavariopsis brachycladia* (Fig. 16)
25. Conidia consisting of 4 obclavate appendages............ *Articulospora moniliforma* (Fig. 43)

26. Main axis clavate, with 3 equidistant divergent appendages arising from apex ....
.... *Clavatospora tentacula* (Fig. 13)
26. Main axis not clavate 34

27. Conidia bent, with a detachment scar at where it bends at one -fifth of its length................
.... *Calcarispora hiemalis* (Fig. 44)
27. Conidia not bent.. 35

28. Conidia with 3 digitate (finger-like) appendages....... *Tetracladium setigerum* (Figs. 36-37)
28. Conidia without 3 digitate appendages 36

29. Conidia unicellular, triangular-shaped and having long, hair-like divergent processes from each corner of the triangle.. *Nawawia filiformis* (Fig. 58)
29. Conidia not unicellular..37

30. Conidia with two bends at the middle, proximal portion (pp) straight to slightly curved; distal portion (dp) forming an angle of 30-120° with the proximal portion ....
.... *Condylospora spumigena* (Fig. 12)
30. Conidia bent, with a rhombic detachment scar near the middle ....
.... *Lunulospora cymbisformis* (Fig. 25)

31. Conidia without filiform appendage .... *Isthmolongispora quadricellularia* (Fig. 26)
31. Conidia with filiform appendage, conidia subulate-conoid, truncate at base........................
.... *Subulispora procurvata* (Fig. 33)

32. Main body 4-celled, with a long appendage arising from each of the four corners of the main body ....*Scutisporus brunneus* (Fig. 34)
32. Main body more than 4-celled 38

33. Conidia consisting of 4 divergent appendages, one of them 1-3-septate, forming the main axis, the other 3 appendages inserted at the upper end of the main axis, one usually longer than the others .... *Articulospora tetracladia* (Fig. 2)
33. Conidia consisting of 4 divergent appendages, one forming the main axis, the other 3 appendages attached to the anterior part of the main axis, but not to the end of the main axis 39

34. Main axis 30-70 μm × 2.4.5 μm, with two 25-60 μm × 2.5-3.5 μm appendages fusing with main axis .... *Alatospora acuminata* (Fig. 1)
34. Main axis 75-300 μm × 2.5-5 μm, bent at the insertion of appendages, with 2 diverging appendages of uniform width (septa indistinct) .... *Tetrachaetum elegans* (Fig. 54)
34. Main axis 150-200 μm, widest (3-4 μm) in the region between the two lateral appendages. The lower lateral appendages arising 50-70 μm from the base and apparently causing a slight deflexion in the direction of growth of the principle axis, a further deflexion occuring when the second lateral arises 15-20 μm above the first...
.... *Tricladium chaetocladium* (Fig. 56)

35. Conidia with a broad detachment scar or base truncate 40
35. Conidia without a broad detachment scar and tapering toward both ends 41

36. Conidia consisting of a 2-celled central axis, lateral outgrowths unbranched, hemispherical or conic to cylindrical, with rounded ends...................... *Pyramidospora fluminea* (Fig. 52)
36. Conidia not consisting of a 2-celled central axis...42

37. Conidia Y-shaped .... *Dicranidion gracile* (Fig. 15)
37. Conidia not Y-shaped 43

38. Main axis consisting a smaller allantoid part and a larger triangular part..........................44
38. Main axis triangular and 8-celled................................. *Diplocladiella scalaroides* (Fig. 18)

39. Conidia constricted at septa 45
39. Conidia not constricted at septa 46

40. Conidia straight or slightly curved, long-fusoid to narrow-obcalvate, (20-)100-210(-275) × 2.5-5.5 μm... *Pseudoanguillospora stricta* (Fig. 51)

40. Conidia straight but later falcate, sigmoid or in an extended helix, up to 90 × 3.5-4.5 μm ... . *Sigmoidea aurantiaca* (Fig. 53)

41. Conidia not longer than 100 μm .... *Anguillospora pseudolongissima* (Fig. 7)

41. Conidia between 100-350 μm in length.................... *Anguillospora longissima* (Figs. 4, 6)

41. Conidia longer than 350 μm .... *Anguillospora gigantea* (Fig. 5)

42. Conidia is a specialized lateral branch system, main axis with usually 3 lateral branches, each lateral behaves like the main axis and may branch to form secondary lateral, the secondary laterals may branch again to form tertiary laterals... .... *Varicosporium delicatum* (Fig. 57)

42. Conidia is not a specialized lateral branch system...47

43. Conidia having an obconical/clavate, 2-3-celled main axis.. .... *Clavariopsis aquatica* (Fig. 47)

43. Conidia having an obconical/clavate, 2-3-celled main axis 48

44. Conidia with apical cells of axis rounded at tip; two of the four appendages usually crossed .... *Campylospora filicladia* (Fig. 11)

44. Conidia with apical celled never rounded at tip; appendages never crossed, appendages (> 30 μm) longer than the triangular or allontoid main parts .... *Campylospora chaetocladia* (Fig. 45)

45. Conidial axis are longer than 50 μm, 6 or more cells, axis elongate end attenuated toward apex, but not subulate .... *Triscelophorus magnificus* (Fig. 41)

45. Conidial axis are not longer than 50 μm, with 5 or less cells, axis subulate......................... .... *Triscelophorus ponapensis* (Fig. 40)

46. Conidial appendages and axis not tapering towards their apices, of uniform width throughout... *Triscelophorus monosporus* (Fig. 39)

46. Condial appendages not curved at base .... *Triscelophorus acuminata* (Fig. 38)

47. Conidia star-shaped...49

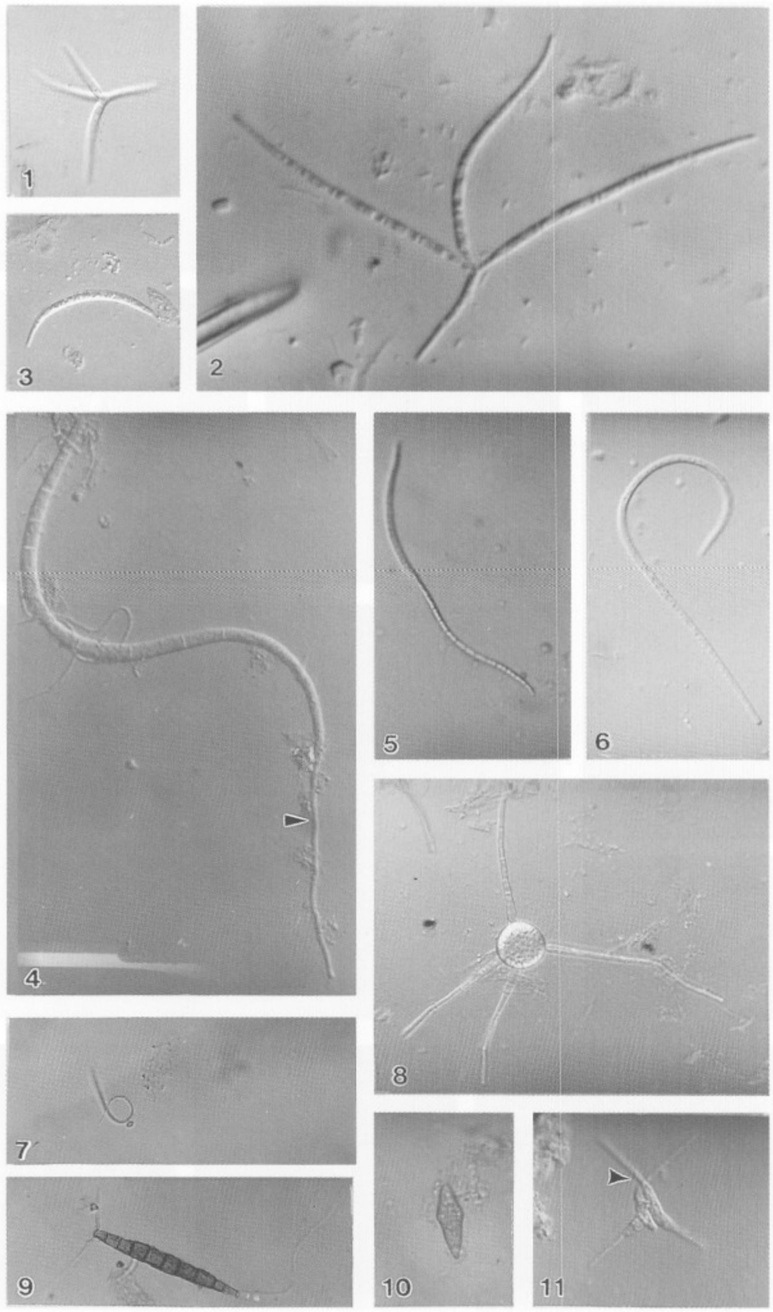
47. Conidia not star-shaped, with the presence of narrow isthmi connecting the arms to the top of the main axis .... *Isthmotricladia gombakiensis* (Fig. 28)

48. Main conidial axis is parallel-walled or slightly tapering to the end, with more or less blunt tips (round apex), appendages with constricted bases, attached to the main axis by an isthmus .... *Tricladium indicum* (Fig. 59)

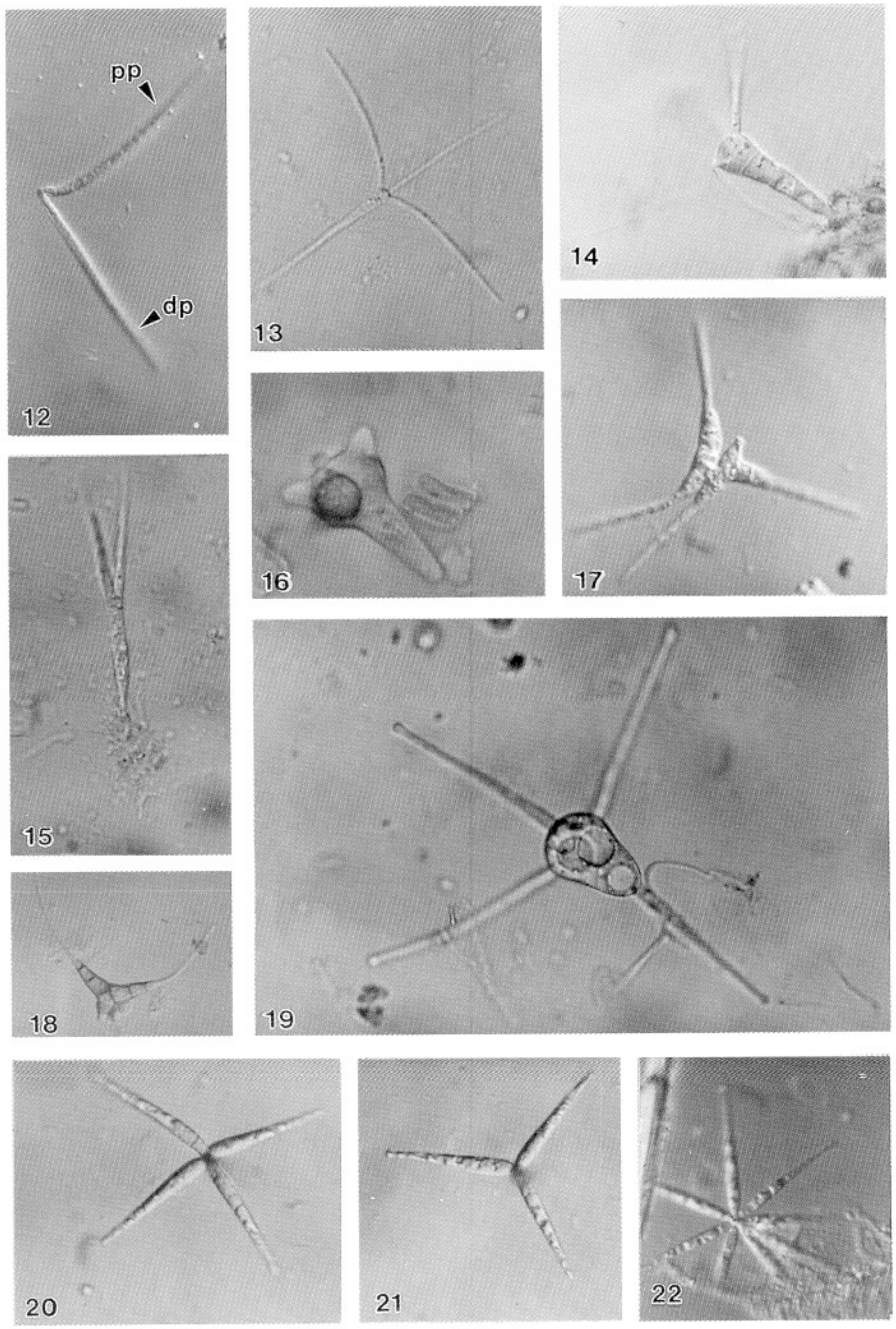
48. Axis cylindrical, usually slightly attenuated near branch insertions, apex acicular, base truncate at first, becoming acicular after conidium release, basal extension percurrent .... *Tricladium attenuatum* (Fig. 55)

49. Conidia with appendages acuminating at one-third to one-half of its length from apex, usually wider than 7.5 μm... *Flabellospora acuminata* (Fig. 23)

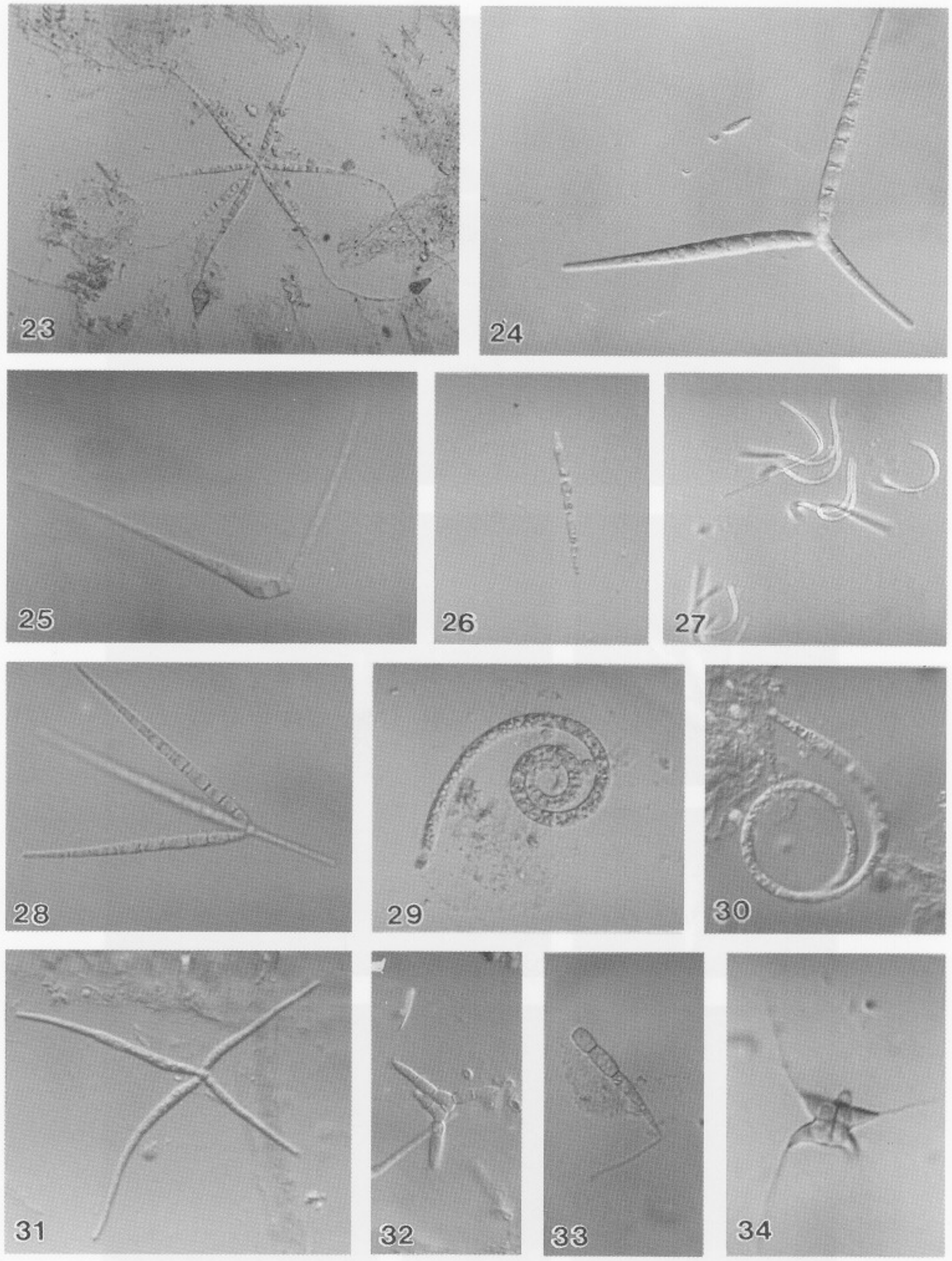
49. Conidia with appendages not acuminating or acuminating at one-fourth or less of its length from apex, not wider than 7.5 μm....................... *Flabellospora verticillata* (Fig. 22)



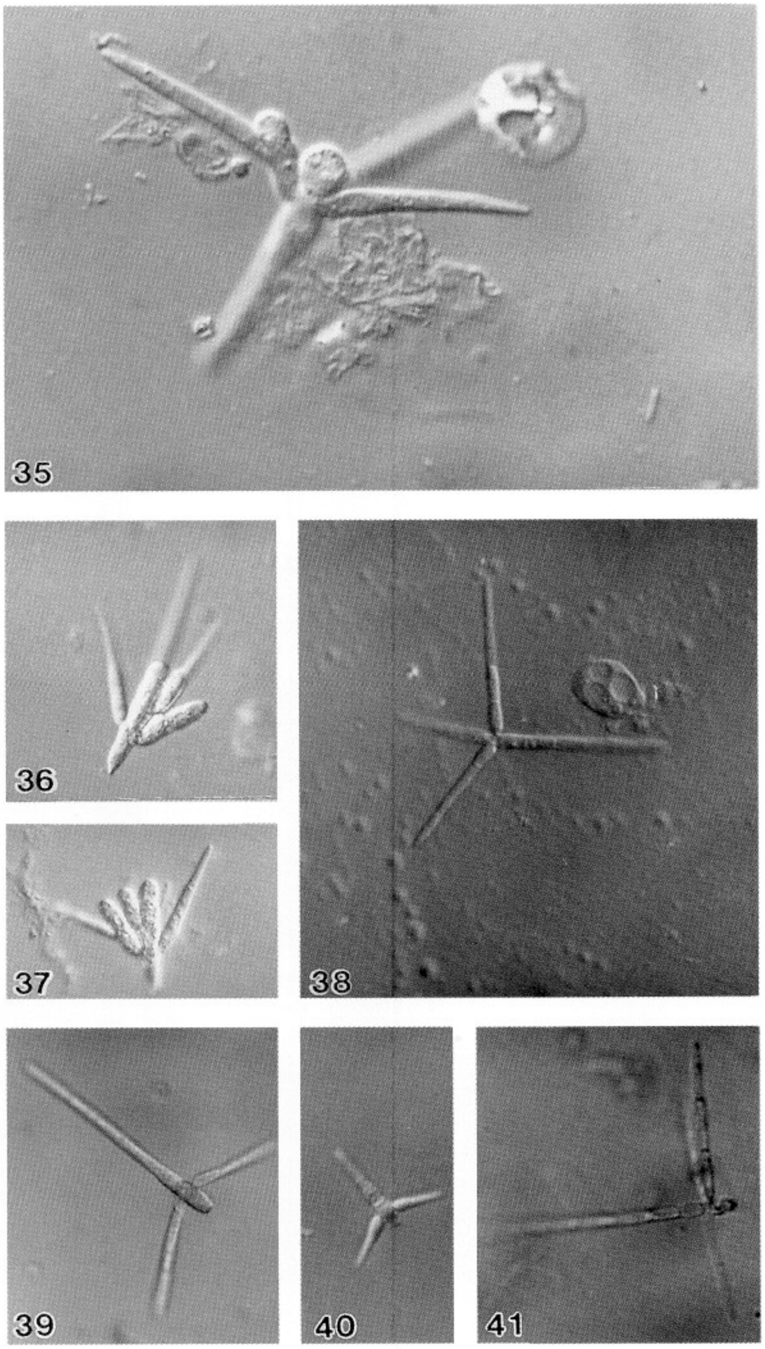
Figs. 1-11. Ingoldian fungi from Hong Kong. **1.** *Alatospora acuminata*. **2.** *Articulospora tetracladia*. **3.** *Anguillospora crassa*. **4, 6.** *Anguillospora longissima*. **5.** *Anguillospora gigantea*. **7.** *Anguillospora pseudolongissima*. **8.** *Brachiosphaera tropicalis*. **9.** *Camposporium antennatum*. **10.** *Beltrania rhombica*. **11.** *Campylospora filicladia*.



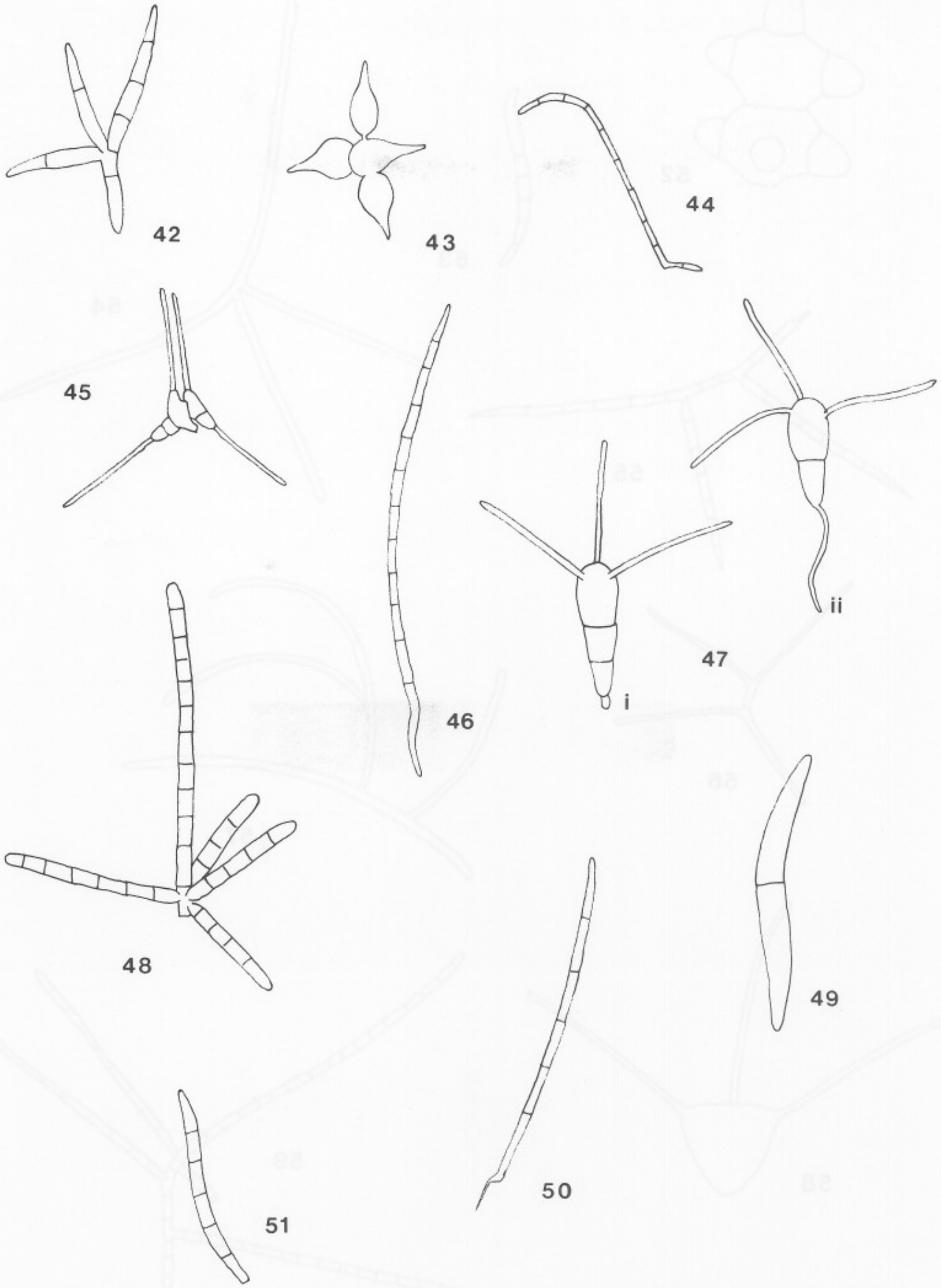
Figs. 12-22. Ingoldian fungi from Hong Kong. **12.** *Condylospora spumigens*. **13.** *Clavatospora tentacula*. **14.** *Clavatospora longibrachiata*. **15.** *Dicranidion gracile*. **16.** *Clavariopsis brachycladia*. **17.** *Campylospora* spp. **18.** *Diplocladiella scalaroides*. **19.** *Clavariana aquatica*. **20-21.** *Flabellospora crassa*. **22.** *Flabellospora verticillata*.



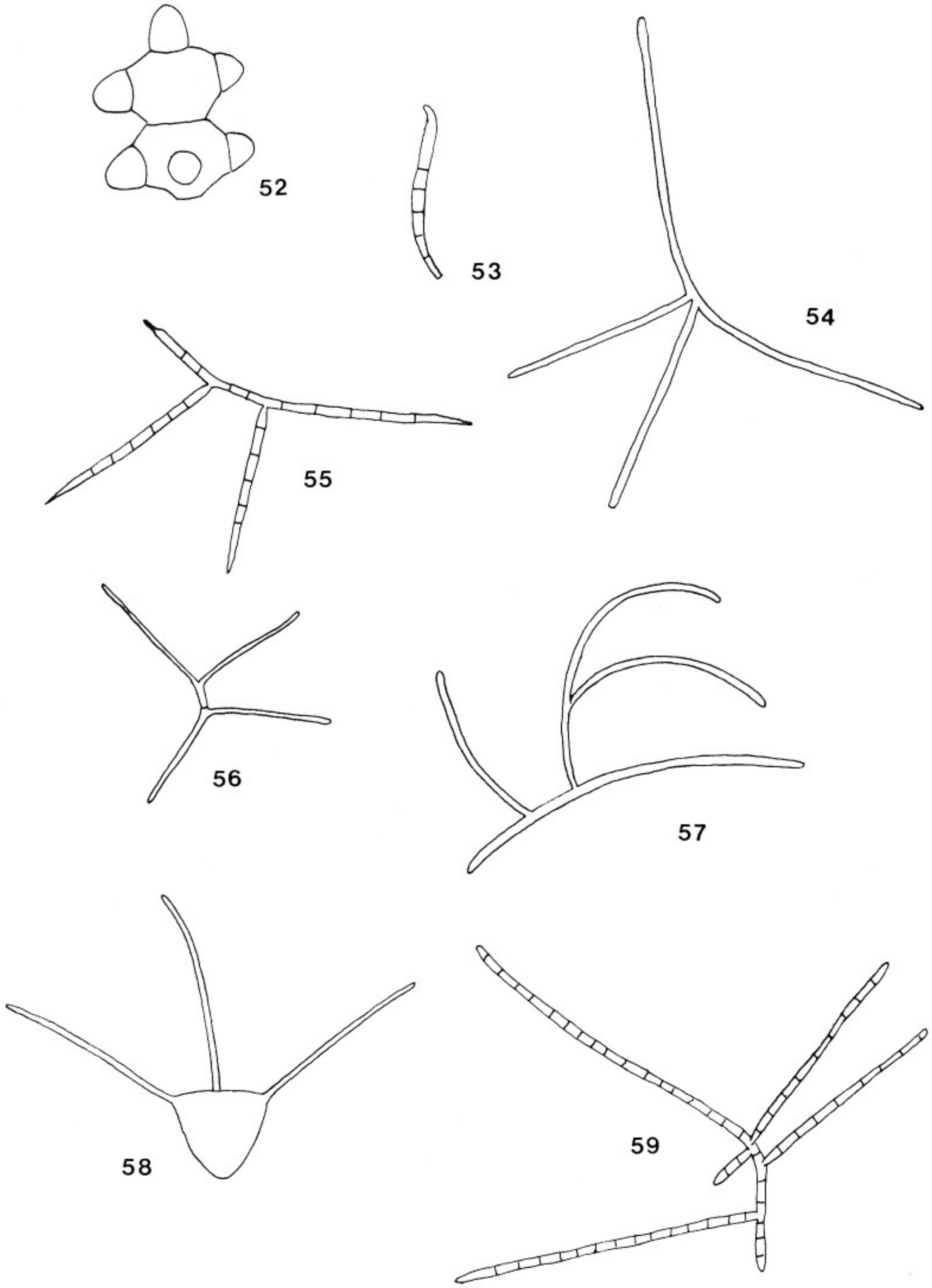
Figs. 23-34. Ingoldian fungi from Hong Kong. **23.** *Flabellospora acuminata*. **24.** *Flabellospora* sp. (not shown in the key). **25.** *Lunulospora cymbisformis*. **26.** *Isthmolongispora quadricellularia*. **27.** *Flagellospora curvula*. **28.** *Isthmotricladia gombakiensis* **29.** *Helicomyces colligatus*. **30.** *Helicomyces torquatus* **31.** *Lemonniera aquatica* **32.** *Tripospermum porosporiferum*. **33.** *Subulispora procurvata*. **34.** *Scutisporus brunneus*.



Figs. 35-41. Ingoldian fungi from Hong Kong. **35.** *Tetracladium marchalianum*. **36-37.** *Tetracladium setigerum*. **38.** *Triscelophorus acuminata*. **39.** *Triscelophorus monosporus*. **40.** *Triscelophorus ponapensis*. **41.** *Triscelophorus magnificus*.



Figs. 42-51. Ingoldian fungi from Hong Kong. **42** *Alatospora pulchella.* **43.** *Articulospora moniliforma.* **44.** *Calcarispora hiemalis.* **45.** *Campylospora chaetoclades.* **46.** *Centrospora aquatica.* **47(i-ii).** *Clavariopsis aquatica.* **48.** *Dendrospora fusca.* **49.** *Flagellospora penicilliodes.* **50.** *Mycocentrospora filiformis.* **51.** *Pseudoanguillospora stricta.*



Figs 52-59. Ingoldian fungi from Hong Kong. **52** *Pyramidospora fluminea.* **53.** *Sigmoidea aurantiaca.* **54.** *Tetrachaetum elegans.* **55.** *Tricladium attenuatum.* **56.** *Tricladium chaetocladium*. **57.** *Varicosporium delicatum*. **58.** *Nawawia filiformis*. **59.** *Tricladium indicum*.

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