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Hyphomycetous fungal diversity in the northeastern hill forests of Arunachal Pradesh, Assam and Nagaland

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ABSTRACT

Owing to inaccessible hilly terrains, dense forest cover and prevailing hostile weather conditions, northeastern states of India have so far remained less explored for fungi. First of its kind, the present study was undertaken to document the hyphomycetous fungal diversity of the region. About 60 litter samples were gathered from the various places visited in three states of the region, viz. Arunachal Pradesh, Assam and Nagaland. A total of 68 species in 52 genera of fungi were recorded from the samples, following moist chamber incubation. Taxonomic diagnosis is given to each of these along with photo-micrographic illustrations.

INTRODUCTION

India encompasses two megabiodiversity zones of the world, the wet-evergreen forests of Western Ghats in the south and humid mountainous forests of northeastern Himalayas. While continued financial support from various national funding agencies facilitated documentation of biological wealth of the forests of Western Ghats in the south to some extent, the rich and luxuriant forests of the northeastern Himalayas in the States of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura remained unexplored largely due to inaccessible hilly terrains, dense forest cover and prevailing hostile weather conditions in the region.

Owing to steep attitudinal variations, the northeastern hill forests exhibit a temperature to sub-tropical climatic condition (Ao and Bordoloi, 2004). The region harbours a variety of wild flowering plants, bamboos, canes, wild bananas, grasses, annuals, shrubs, lianas, wild mushrooms, algae, aquatics and extensive canopy of tall trees interspersed by epiphytic mosses, ferns and lichens. While some data on lichen and macrofungi is available (Sarbhoy *et al.*, 1996; Sati *et al.*, 1997; Bilgrami *et al.*, 2004; Dhingra, 2006) not much has been made known on microfungal diversity of the region.

An explorative trip was undertaken during July 2006, to a few localities in Arunachal Pradesh, Assam and Nagaland, as part of an 'All-India Coordinated Project on Taxonomy (AICOPTAX) of Fungi' of the Ministry of Environment and Forests, New Delhi, to document the mycoflora of the region. This paper details out the hyphomycetous fungi documented from this foray.

Hyphomycetes are a big group and constitute 22% of the fungal domain (Hawksworth *et al.*, 1995). These are asexual morphs or anamorphs, typically microscopic and reproductive propagules, the spores or conidia. The mode of spore formation is a stable, biological phenomenon and conidium development or conidium ontogeny has been the criteria based on which the asexual fungi have been diagnosed and classified (Hughes, 1953; Subramanian, 1971; Ellis, 1971, 1976; Matsushima, 1971, 1975; Carmaichael *et al.*,

1980, Seifert and Gams, 2001). The shape of conidiogenous cells and conidium, development and mode of secession of conidium and type of proliferation of the conidiogenous cells are characters closely reflective of conidium ontogeny. Further, shape of conidiogenous cells and their position on the conidiophore, pattern of branching and arrangement of conidiophores have also been considered significant to distinguish the genera of Hyphomycetes. Characters such as aggregation of conidiophores in the form of sporodochium or synnemata, development of stromata, presence or absence, position and arrangement of setae and pigmentation in conidia or conidiophores have all led to the delimitation of many genera of the hyphomycetes (Kirk et al., 2001).

MATERIALS AND METHODS

About 60 litter samples were gathered from the various places visited in the region (Fig. 1). Dead and decaying plant litter constituted bulk of the samples collected. Fallen leaves, small pieces of twigs or decaying wood bark were picked up at a site and placed in collection bags. A piece of naphthalene pellet was added to each bag to deter extraneous insects and worms present in the samples from feeding on the fungi during transit.

Conventional mycological techniques were followed to isolate, diagnose and document the fungi in the laboratory (Hawksworth, 1974). The specimens based on which descriptions written were deposited at the Herbarium of the Department of Botany, Goa University (Herb. GUBH) and part of some of the newly described fungi from the region was deposited at HCIO (Herb. Cryptogamic India Orientalis, New Delhi).

RESULTS

Though not exhaustive, in the present study, a total of 68 species in 52 genera of hyphomycetous fungi were

Table 1: Hyphomycetous fungi documented from Arunachal Pradesh, Assam and Nagaland

Fungus	Substrate	Locality	*Acc. No.*
Acremonium strictum	Decaying twig	Namdapha pass	GUBH:AN-24
Acrodictys dennissii	Decaying twig	Mokokchung	GUBH:AN-32
Acrodictys erecta	Decaying twig	Namdapha pass	GUBH:AN-39
Acrodictys globulosa	Decaying twig	Namdapha pass	GUBH:AN-41
Chaetopsina hongkongenis	Decaying twig	Namdapha pass	GUBH:AN-79
Chaetopsina nimbae	Decaying twig	Namdapha pass	GUBH:AN-20
Chloridium clavaeforme	Decaying leaf	Tezu	GUBH:AN-43
Chloridium sp.	Bamboo culm	Tezu	GUBH:AN-69
Cladosporium cladosporoides	Decaying leaf	Kaziranga	GUBH:AN-77
Codinaea fetilis	Calamus leaf	Namdapha pass	GUBH:AN-83
Cordella sp.	Decaying leaf	Mokochung	GUBH:AN-55
Curvularia pallescens	Grass culm	Namdapha pass	CUBH:AN-65
Cylindrocladium sp.	Decaying twig	Namdapha pass	GUBH:AN-78
Dactylaria uniseptata	Decaying twig	Mokochung	GUBH:AN-34
Dendryphiella infuscans	Bamboo culm	Tezu	GUBH:AN-70
Dendryphion comosum	Decaying twig	Tezu	GUBH:AN-73
Dend. yphiopsis biseptata	Decaying twig	Tezu	GUBH:AN-45
Dicranidin gracilis	Decaying twig	Namdapha pass	GUBH:AN-57
Dischloridium laeense	Decaying twig	Mokokchung	GUBH:AN-13
Ednundmasonia pulchra	Bamboo culm	Namdapha pass	GUBH:AN-63

Fig. 1 Map of North-eastern States of India showing collection sites (•)

Fungus	Substrate	Locality	Acc. No.
Fusarium incarnatum	Grass culm	Kaziranga	GUBH:AN-2
Gangliostilbe indica	Bamboo culm	Namdapha pass	GUBH:AN-64
Gliocladium aurifilum	Decaying twig	Mokokchung	GUBH:AN-18
Graphium putredinis	Unidentified bark	Namdapha pass	GUBH:AN-76
Helicoma indicum	Decaying twig	Mokokchung	GUBH:AN-35
Helicomyces roseus	Bamboo culm	Mokokchung	GUBH:AN-74
Helicosporium phragmitis	*Dillenia* leaf	Tezu	GUBH:AN-11
Hermatomyces tucumanensis	Decaying twig	Namdapha pass	GUBH:AN-59
Kostermansinda minima	Decaying twig	Namdapha pass	GUBH:AN-42
Menisporopsis sp.	*Grass* culm	Kaziranga	GUBH:AN-4
Minimidochium setosum	Grass culm	Namdapha pass	GUBH:AN-7
Monodictys abuensis	Bamboo leaf	Mokochung	GUBH:AN-9
Monodictys paradoxa	Decaying twig	Namdapha pass	GUBH:AN-58
Monodictys putredinis	Decaying twig	Mokokchung	GUBH:AN-14
Monodictys sp.	Decaying twig	Tezu	GUBH:AN-33
Myrothecium advena	Decaying leaf	Mokokchung	GUBH:AN-51
Nigrospora sphaerica	Bamboo leaf	Mokokchung	GUBH:AN-10
[illegible]	Decaying twig	[illegible]	GUBH:AN-25
Periconia cookei	Decaying twig	Mokokchung	GUBH:AN-30
Periconia sacchari	Grass culm	Kaziranga	GUBH:AN-5
Petrakia sp.	Decaying twig	Kaziranga	GUBH:AN-62
Phaeoisaria clematidis	Decaying twig	Mokokchung	GUBH:AN-60
Phaeorumularia sp.	Decaying twig	Mokokchung	GUBH:AN-22
Phaeostalagmus tenuissimus	Wild banana leaf	Kaziranga	GUBH:AN-81
Pithomyces chartarum	Decaying leaf	Tezu	GUBH:AN-48
Pithomyces graminicola	Grass culm	Kaziranga	GUBH:AN-3
Pithomyces pulvinatus	Decaying twig	Tezu	GUBH:AN-71
Pithomyces sacchari	Decaying twig	Mokokchung	GUBH:AN-31
Pleurophragmium sp.	Decaying twig	Namdapha pass	GUBH:AN-38
Pleurophragmium sp.	Decaying twig	Namdapha pass	GUBH:AN-40
Podosporium nilgirense	Bamboo culm	Mokokchung	GUBH:AN-17
Podosporium rigidum	Decaying twig	Mokokchung	GUBH:AN-16
Sarocladium oryzae	Decaying twig	Namdapha pass	GUBH:AN-37
Spadicoides verrucosa	Decaying bark	Namdapha pass	GUBH:AN-75
Sporidesmiopsis malabarica	Decaying twig	Mokokchung	GUBH:AN-29
Sporidesmium aapacae	Grass culm	Kaziranga	GUBH:AN-1
Sporidesmium sp.	Decaying twig	Tezu	GUBH:AN-72
Taeniolella stilbospora	Decaying twig	Mokokchung	GUBH:AN-21
Tetraploa aristata	Grass culm	Kaziranga	GUBH:AN-6
Torula herbarum	Decaying leaf	Tezu	GUBH:AN-46
Trichobotrys effusa	Bamboo leaf	Mokokchung	GUBH:AN-8
Veronaea sp.	Bamboo culm	Tezu	GUBH:AN-67
Virgatospora echinofibrosa	Decaying twig	Mokokchung	GUBH:AN-27
Virgatospora natarajanensis	Bamboo leaf	Mokokchung	GUBH:AN-26
Vittalia indica	Decaying twig	Tezu	GUBH:AN-50
Volutella sp.	Decaying twig	Namdapha pass	GUBH:AN-19
Wiesneriomyces laurinus	Decaying twig	Mokokchung	GUBH:AN-12
Xenosporium africanum	Bamboo culm	Tezu	GUBH:AN-68

recorded for the first time from the northeastern part of the country. Two of these taxa, viz. *Helicoma indicum* Gawas & Bhat and *Vittalia indica* Gawas & Bhat were found to be new to science (Gawas & Bhat, 2007). The fungi are listed (Tabie 1), described and illustrated below.

Acremonium strictum W. Gams, 1971. *Cephalosporium-artige Schimmelpilze* (Stuttgart): 42. (Fig.2)

Colonies effuse, white. *Conidiophores* mononematous, macronematous, unbranched sub-hyaline, 18 – 26 × 3 – 4 µm. *Conidiogenous cells* monophialidic, integrated, terminal. *Conidia* solitary, arising in slimy heads, hyaline to subhyaline, ellipsoidal, smooth, aseptate, 3 – 3.5 × 1 – 1.5 µm.

Specimen examined: On decaying twigs of an unidentified tree, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH:AN-24.

Acrodictys dennisii M.B. Ellis, 1964. *Mycol. Pap.* **79**: 15. (Fig 3)

Colonies effuse, grayish brown. *Conidiophores* mononematous macronematous, erect, dark brown, smooth, 2-4-septate, arising individually, 130 – 160 × 5 – 7 µm. *Conidiogenous cells* terminal, monoblastic. *Conidia* borne singly, dry, dark brown to black, broadly clavate, muriform, 10 – 45 × 7 – 38 µm.

Specimen examined: On decaying twig of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. UBH-AN-32

Acrodictys erecta (Ellis & Everh.) M.B. Ellis, 1961. *Mycol. Pap.* **79**: 12. (Fig. 4)

Colonies effuse, grayish brown, velvety. *Conidiophores* mononematous, macronematous, erect, straight, smooth, septate, 80 – 125 × 6 – 8 µm. *Conidiogenous cells* terminal, monoblastic. *Conidia*, solitary, dry, pale to dark brown, muriform, with characteristic transverse and longitudinal septa, 25 – 35 × 15 – 20 µm.

Specimen examined: On a dead and decaying bamboo twig, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 11.07.06, Herb. No. GUBH:AN-39.

Acrodictys globulosa (Toth) M.B. Ellis, 1965. *Mycol. Pap.* **103**: 34. (Fig. 5)

Colonies effuse, granular, light brown. *Conidiophores* mononematous, macronematous, erect, straight, smooth, 3-7-septate, arising individually, 60 – 90 × 4 – 6 µm. Conidiogenous cells terminal, monoblastic. Conidia solitary, pale brown, globose, smooth, 18 – 24 µm diam., with transverse and longitudinal septa; young conidia, hyaline to sub-hyaline.

Specimen examined: On a – dead and decaying bamboo twig, Namdapha National Park, Arunachal Pradesh, coll. DJ Bhat,11.07.06, Herb. No. GUBH: AN-41

Chaetopsina hongkongensis Goh & K.D. Hyde, 1997. *Mycol. Res.* **101**(12): 1518. (Fig. 6)

Colonies effuse, hairy, dark brown. *Conidiophores* mononematous, macronematous, branched, olivaceous brown, smooth, 150 – 230 × 8 – 10 µm. *Conidiogenous cells* polyphialidic, discrete, elongated, terminal and intercalary. *Conidia* aggregated in slimy heads, cylindrical with rounded ends, smooth, hyaline, aseptate, 6 – 8 × 2 – 2.5 µm.

Specimen examined: On decaying twigs of an unidentified tree, Namdapha National Park, Arunachal Pradesh, —DJ Bhat, 13.07.06, Herb. No. GUBH:AN-79.

Chaetopsina nimbae Rambelli, 1992. *Mycotaxon* **44**(2): 328. (Fig. 7)

Colonies effuse, hairy, light brown. *Conidiophores* mononematous, macronematous, olivaceous brown, smooth, 4-6-septate, setiform, 300 – 350 × 4 – 6.5 µm. *Conidiogenous cells* polyphialidic, discrete,

intercalary. *Conidia* aggregated in slimy heads, cylindrical with rounded ends, smooth hyaline, aseptate, 8 – 12 × 2 – 2.5 µm.

Specimen examined: On decaying twigs of an unidentified tree, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb No. GUBH: AN-20.

Chloridium clavaeforme (Preuss) W. Gams & Hol-Jech., 1976. *Stud. Mycol.* **13**: 31.

Colonies effse, white, velvety. *Conidiophores* mononematous, macronematous, light brown, paler towards the apex, unbranched, smooth, 2-4-septate, 130 – 150 × 1 – 3 µm. *Conidiogenous cells* monophialidic, terminal, proliferating. *Conidia* in slimy heads, ellipsoidal, smooth, hyaline, aseptate, 2 – 2.5 × 1 – 1.5 µm.

Specimen examined: On decaying leaves of an unidentified tree, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH:AN-43.

Cladosporium cladosporioides (Fresen.) G.A. de Vries, 1952.*Contrib. Knowledge on the Genus Cladosporium Link es Fries:* 57. (Fig. 9)

Colonies effuse, light brown, powdery. *Conidiospores* mononemantos, macronemtos, brown, 5-10-septate, branched, 80 – 100 × 3 – 5 µm. Conidiogenous cells terminal, polyblastic. Ramoconidia present with elongated, prominent polyblastic scars. *Conidia* catenate, dry, broadly fusiform with scars at the point of attachment, 6 – 6.5 × 3 – 4.5 µm.

Specimen examined: On decomposing leat-litter of an unidentified tree, Kaziranga National Park, Assam, DJ Bhat, 15.07.06, Herb. No. GUBH:AN-77.

Codinaea fertilis S. Hughes & W.B. Kendr. 1968, *N.Z. Jl Bot.* 6: 347. (Fig. 10)

Colonies effuse, hairy, dark brown. *Conidiophores* mononematous, macronematous, unbranched, smooth, dark brown, paler towards the apex, 130 – 150 × 2 – 4 µm. *Conidiogenous cells* polyphialidic, integrated, with conspicuous collerettes. Conidia aggregated in slimy heads, falcate, smooth, subhyaline, 3-septate, with 1-setulae, at each end, 12 – 17 × 2 – 4.5 µm.

Specimen examined: On dead and decaying *Calamus* leaves, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-83.

Curvularia pallescens Boedijn, 1933, *Bulletin du Jardin Botanique de Buitenzorg*, 3 Serie **13**(1): 127. (Fig. 11)

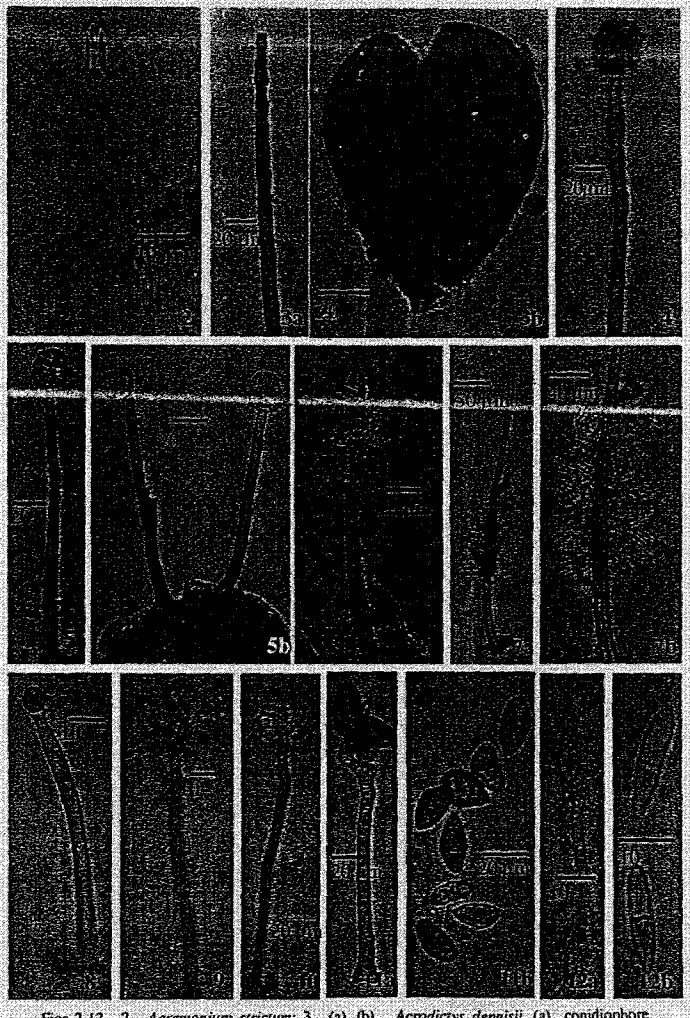
Colonies effuse, dark brown, velvety. *Conidiophores* mononematous, macronematous, olivaceous brown, unbranched, 80 – 120 × 4 – 6.5 µm. *Conidiogenous cells* polytretic, terminal becoming intercalary, sympodial. *Conidia* solitary, ellipsoidal, with swollen central cell, sometimes curved, pale brown, smooth, 3-4-septate, 20 – 26 × 8 – 15 µm.

Specimen examined: On dead gras culms, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.2006, Herb. No. GUBH:AN-65.

Dactylaria uniseptata Matsush., 1971. *Microfungi of the Solomon Islands and Papua-New Guinea* (Osaka): 19. (Fig.12)

Colonies effuse, white, velvety. *Conidiospores* mononematous, macronematous, subhyaline, 2-4-septate, smooth, 45 – 60 × 2 – 4 µm. *Conidiogenous cells* discrete, polyblastic, denticulate. *Conidia* solitary, clavate, hyaline to sub-hyaline, uniseptate, smooth, 17 – 20 × 5 – 7 µm.

Specimen examined: On decaying twig of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-34



Figs 2-12. 2. *Acremonium strictum*; 3. (a), (b) *Acrodictys dennisii*. (a) conidiophore, (b) conidia; 4. *Acrodictys erecta*; 5. (a), (b) *Acrodictys globulosa*; 6. *Chaetopsina hongkongensis*; 7. (a), (b) *Chaetopsina nimbae*; 8. *Chloridium* sp., 9. *Cladosporium cladosporioides*; 10. *Codinaea fertilis*; 11. (a), (b) *Curvularia pallescens* (a) conidiophore, (b) conidia; 12. (a) (b) *Dactylaria uniseptata*. (a) conidiophore, (b) conidia.

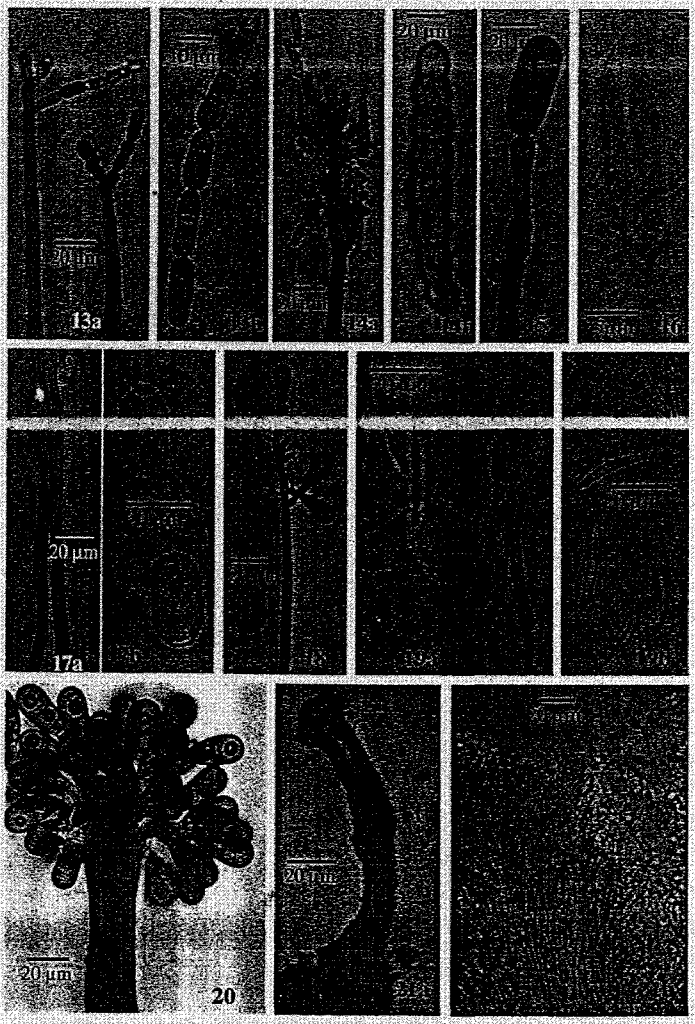


Fig. 13-21. 13a, b. *Dendryphiella infuscans*. a conidiophore, b. conidia; 14 a, b. *Dendryphion comosum*. a. conidiophore, b. conidia; 15. *Dendryphiopsis bisepiata*; 16. *Dicranidion gracilis*; 17 a, b. *Dischloridium laxense*. a. conidiophore, b. conidia; 18. *Edmundmasonia pulchra*; 19 a, b. *Fusarium incarnatum*. a. conidiophore, b conidia; 20. *Gangliostible indica*; 21 a, b. *Gliocladium aurifilum* a. synnemata b. closer view

Dendryphiella infuscans (Thum.) -M.B. Ellis, 1971. *Dematiaceous Hyphomycetes* (Kew): 500. (Fig. 13)

Colonies effuse, dark brown, velvety. Conidiophores mononematous, macronematous, mid to dark brown, 180 – 220 × 6 – 10 µm. *Conidiogenous cells* polytretic, terminal becoming intercalary, sympodial. *Conidia* in chains, oblong, rounded at both ends, pale to mid brown, smooth, uniseptate, 16 – 20 × 6 – 10 µm.

Specimen examined: On dead bamboo culms, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.2006, Herb. No. GUBH:AN-70.

Dendryphion comosum Wallr., 1833, Fl. Crypt. Germ., 2: 300 (Fig. 14)

Colonies effuse, dark brown. *Conidiophores* macronematous, mononematous, mid to dark brown, 4-5-septate, branched, 150 – 170 × 8 – 11 µm. *Conidiogenous cells* polytretic, discrete, terminal. *Conidia* catenate, cylindrical, pale to olivaceous brown, minutely verruculose, 1-8-septate, constricted at the septa, 5 – 30 × 7 – 10 µm.

Specimen examined: On dead twigs of an unidentified tree, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.2006, Herb. No. GUBH: AN-73.

Dendryphiopsis biseptata Morgan-Jones, R.C. Sinclair & Eicker, 1983, Mycotaxon 17: 304. (Fig.15)

Colonies effuse, dark brown. *Conidiophores* macronematous, mononematous, mid to dark brown, 320 – 350 × 8 – 10 µm. *Conidiogenous cells* monotretic integrated, terminal. *Conidia* solitary, oblong, rounded at both ends, mid to dark brown, 2-septate, 25 – 45 × 18 – 20 µm.

Specimen examined: On dead twigs of an unidentified tree, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.2006, Herb. No. GUBH: AN-45.

Dicranidion gracillis Matsush. 1971. *Microfungi of the Solomon Islands and Papua- New Guinea* (Osaka): 24. (Fig. 16)

Colonies effuse, grayish white, wet, velvety. *Conidiophores* mononematous, micronematous, arising singly or in a palisade layer, subhyaline. *Conidiogenous* cells terminal, monoblastic. *Conidia* solitary. *Y*-shaped, hyaline, multiseptate, smooth, 17 – 23 µm long.

Specimen examined: On decaying twig of an unidentified tree, Namdapha National Park, DJ Bhat, 11.07.06, Herb. No. GUBH: AN-57

Dischloridium laeense (Matsush.) B. Sutton, 1976, *Kavaka* (1977) 4: 47. (Fig. 17)

Colonies effuse, hairy, dark brown, velvety. *Conidiophores* mononematous, macronematous, mid to dark brown, 3-5-septate, unbranched, smooth, 210 – 250 × 6 – 8.5 µm. *Conidiogenous cells* monophialidic, terminal, sometimes proliferating. *Conidia* in slimy heads, smooth, subhyaline, aseptate, cylindrical with rounded apex and truncate base, 20 – 22 × 12 – 15 µm.

Specimen examined: On decaying twigs of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-13.

Edmundmasonia pulchra Subram. 1958, *J. Indian bot. Soc.* 37: 403. (Fig. 18)

Colonies effuse, hairy, dark brown. *Conidiophores* mononematous, macronemat -ous, pale dark brown, 3-7-septate, unbranched, smooth, 480 – 610 × 4 – 8 µm. *Conidiogenous cells* monoblastic. *Conidia* solitary, clavate, phragmoseptate, subhyaline, 20 – 28 × 6 – 10 µm.

Specimen examined: On dead bamboo culms, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-63.

Fusarium incarnatum (Desm.) Sacc., 1886. *Syll. fung.* (Abellini) **4**: 712. (Fig. 19)

Colonies effuse, white. *Conidiophores* macronematous, mononematous, septate, profusely branched, smooth, subhyaline to hyaline, 80 – 100 × 2 – 3 µm. *Conidiogenous cells* initially polyblastic later becoming monophialidic. *Conidia* smooth, hyaline, falcate; blastoconidia dry, 1-3 septate, 30 – 35 × 4 – 6 µm; phialoconidia inslimy heads, 3-5 septate, 20 – 32 × 4 – 6 µm.

Specimen examined: On decaying culms of unidentified grass, Kaziranga Heritage Park, Assam, DJ Bhat, 15.07.2006, Herb. No. GUBH AN-02.

Gangliostilbe indica Subram. & Vittal, in Vittal, 1976, (1975) *Kavaka* 3: 70 (Fig.20)

Colonies effuse, hairy, dark brown. *Conidiophores* synnematous, dark brown to black, septate, unbranched, 270 – 350 µm long, 18 – 22 µm wide at the stipe region, flared at the tip. *Conidiogenous cells* gangliar, terminal, mostly recurved. *Conidia* solitary, dark brown, smooth, clavate, guttulate, with 3 unequal septa. 35 – 45 × 14 – 20 µm.

Specimen examined: On dead bamboo culms, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-64.

Gliocladium aurifilum (W.R. Gerard) Seifert, Samuels & W. Gams, 1985, in Seifert, *Stud. Mycol.* 27: 148. (Fig. 21)

Colonies effuse, white. *Conidiophores* synnematous, septate, branched, smooth, pale to mid brown, 1500 – 2000 × 140 – 200 µm. Each conidiophore densely branched at the apex to give a brush-like appearance. *Conidiogenous* cells monophiladic. *Conidia* in slimy heads, smooth, subhyaline, ovoid, aseptate, 6 – 6.5 × 3 – 3.5 µm.

Specimen examined: On decaying culms of an unidentified grass, Mokokchung, Nagaland, DJ Bhat, 09.08.2006, Herb. No. GUBH: AN-18.

Graphium putredinis (Corda) S. Hughes, 1958, *Can. J. Bot.* 36: 770. (Fig. 22)

Colonies effuse, dark brown. *Conidiophores* synnematous, pale brown, 440 – 550 µm long, 12 – 16 µm wide in the stipe region. *Conidiogenous cells* annelidic. *Conidia* aseptate, hyaline to pale olivaceous brown, smooth, ellipsoidal, 4 – 6 × 2 – 2.5 µm.

Specimen examined: On decaying twigs of an unidentified tree, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-76

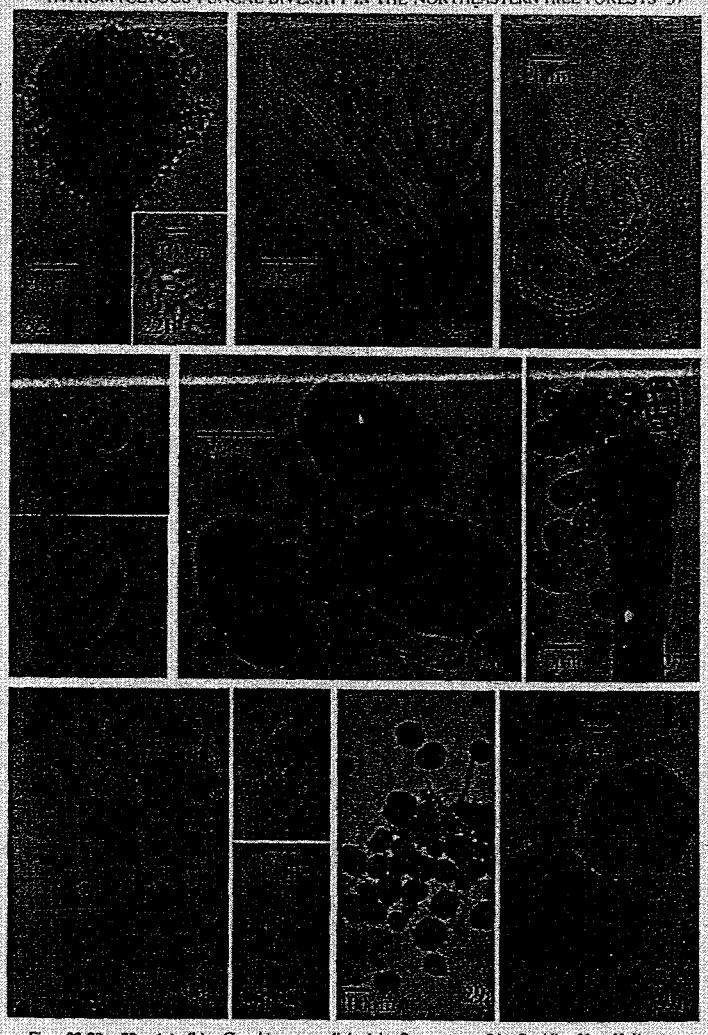
Helicoma indicum Gawas & Bhat, 2007. *Mycotaxon* **100**: 295-303. (Fig. 23)

Conidiophores macronematous, mononematous, grouped in dense fascicles, divergent, olivaceous brown, septate, smooth, up to 200 µm, 2 – 3 µm wide. Conidiogenous cells polyblastic, distinctly denticulate, terminal, integrated. Conidia solitary, dry, hyaline, smooth, uniseptate, coiled 0.5-0.75 times, 5.5 – 7.5 µm diam; conidial filament 3 – 3.5 µm wide.

Specimen examined: On dead twig of unidentified tree, Mokokchung, Nagaland, coll. by DJ Bhat, 09.07.06, Herb. No. GUBH: AN-35, HCIO 46952.

Helicomyces roseus Link, 1809, *Magazin Ges. naturf. Freunde, Berlin* 3: (1-2) 21. (Fig. 24)

Colonies effuse, grayish white, velvety. *Conidiophores* mononematous, macronematous, dark to medium brown, 3-6-septate, branched, smooth, 55 – 70 × 3 – 7 µm. *Conidiogenous cells* polyblastic, distintly denticulate. *Conidia* solitary, hyaline, smooth, uniseriately coiled, multiseptate, 40 – 50 µm diam., filaments 3 – 4.5 µm wide.



Figs. 22-29. 22. (a), (b) *Graphium putredinis*: (a) Synnemata, (b) Conidia; 23. *Helicoma indicum*; 24. *Helicomyces roseus*; 25. *Helicosporium phragmitis*; 26. *Hermatomyces tucumanensis*; 27. *Kostermansinda minima*; 28. (a), (b) *Minimidochium setosum*. (a) Sporodochia (b) Conidia 29. (a), (b) *Monodictys abuensis*. (a), (b) conidia

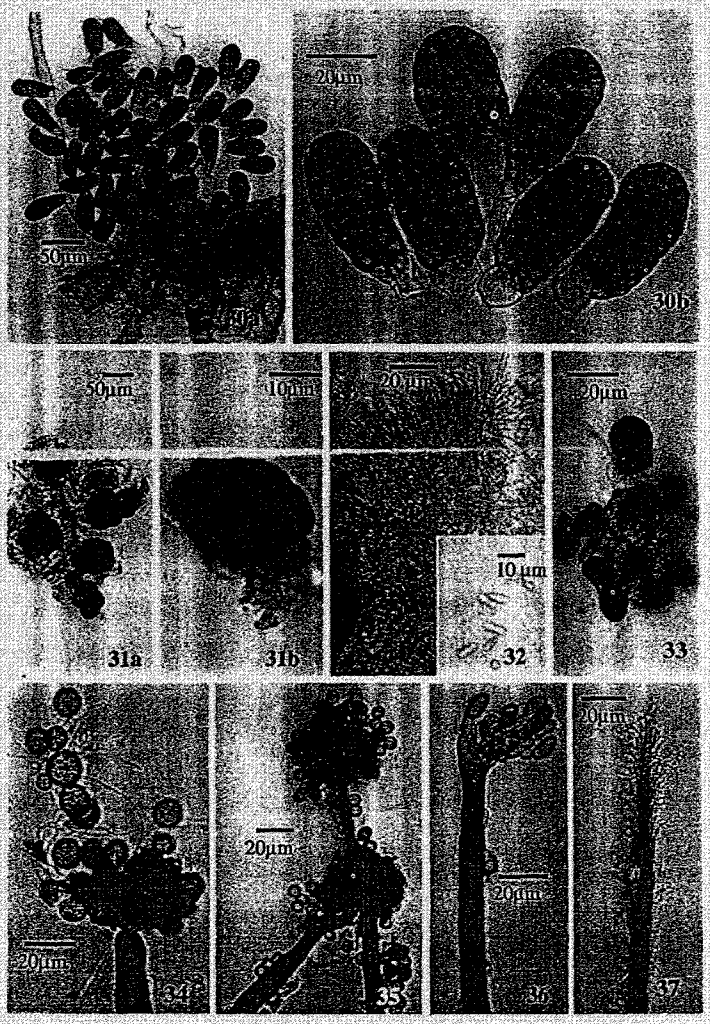


Fig. 30-37. 30 (a), (b) *Monodictys paradoxa* a, b conidia; 31. *Monodictys putredinis*; 32. *Myrothecium roridum*; 33. *Nigrospora sphaerica*; 34. *Periconia byssoides*; 35. *Periconia cookei* 36. *Periconia sacchari*; 37. *Phaeoisaria clematidis*.

Specimen examined: On dead bamboo culms. Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH-AN-74.

Helicosporium phragmitis Hohn., 1905. *Annls. Mycol.*, **3**: 338. (Fig.25)

Colonies effuse, grayish brown, velvety. *Conidiophores* mononematous, macronematous, olivaceous to dark brown, setiform at the apex, 100 – 150 × 2 – 4.5 µm. *Conidiogenous cells* discrete, polyblastic, minutely denticulate. *Conidia* solitary, hyaline, smooth, helicoid, multiseptate, 14 – 20 µm diam.; filaments 1.5 – 2.5 µm wide.

Specimen examined: On decaying leaves of *Dillenia* sp., Tezu, Arunachal Pradesh., DJ Bhat, 13.07.06, Herb. No. GUBH: AN-11

Hermatomyces tucumanensis Speg., 1911. *Annals del Museo Nacional de Hist. Nat. de Buenos Aires* **13**: 446. (Fig. 26)

Colonies puncate, dark brown, velvety. *Conidiophores* in compact fascicles, micronematous, arising from a cushion-like mycelial mat, pale brown. *Conidiogenous cells* monoblastic. *Conidia* solitary, smooth, muriform, with central cells dark brown to black, peripheral cells pale coloured, 20 – 32 × 16 – 20 µm.

Specimen examined: On decaying twigs of an unidentified tree, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 11.07.06, Herb. No. GUBH: AN-59

Kostermansinda minima Cabello & Aramb. 1987. *Mycotaxon* **29**: 32. (Fig. 27)

Colonies effuse, dark brown, hairy, velvety. *Conidiophores* synnematous, macronematous, septate, olivaceous to dark brown, flared and fertile at the tip, 200 – 230 × 18 – 25 µm. *Conidiogenous cells* monoblastic. *Conidia* solitary, ellipsoidal, muriform, 20 – 27 × 16 – 18 µm.

Specimen examined: On unidentified cane culms, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 11.07.06. Herb. No. GUBH: 42

Minimidochium setosum B. Sutton, 1969. *Can. J. Bot.* (1970) 47(12): 2095. (Fig. 28)

Colonies effuse, pale brown. Conidiomata sporodochial, setiform. Setae long, slender, dark brown to black. *Conidiophores* sporodochial, penicillately branched above, subhyaline to pale brown, 90 – 240 µm long. *Conidiogenous cells* monophialidic, discrete, with inconspicuous collarette. *Conidia* aggregated fusiform, curved, smooth, subhyaline, with setulae, aseptate, 5.5 – 7.5 × 2 µm.

Specimen examined On dead bamboo culms, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.06, Harb. No. GUBH: AN-07.

Monodictys abuensis (Chouhan & Panwar) V. Rao & de Hoog, 1986. *Stud. Mycol.* **28**: 26. (Fig.29)

Colonies effuse, dark brown, granular, velvety. *Conidiophores* mononematous, micronematous. *Conidiogenous cells* terminal, monoblastic. *Conidia* solitary, dark brown to black, irregularly globose, 45 – 70 µm in diam., with several transverse and longitudinal septa.

Specimen examined: On dead twigs of unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-09.

Monodictys paradoxa (Corda) S. Hughes, 1958, *Can. J. Bot.* **36**: 786. (Fig. 30)

Conidiophores micro-orsemi-macronematous, mononematous, arising singly or in fascicles, subhyaline. Conidiogenous cells polyblastic. Conidia irregularly oblong, muriform, dark-brown, 35 – 55 × 15 – 20 µm, with a hyaline basal cell.

Specimen examined: On dead twig of unidentified tree. Namdapha National Park, leg DJ Bhat, 11.07.06, Herb. No. GUBH: AN-58

Monodictys putredinis (Wallr.) S. Hughes, 1958. *Can J. Bot*, 36: 785. (Fig. 31)

Colonies effuse, dark brown, granular, velvety. *Conidiophres* mononematous, micronematous to semi-macronematous. *Conidiogenous cells* terminal, monoblastic. *Conidia* solitary, dark brown to black, sub-globose to pyriform. 15 – 28 × 12 – 20 µm, with several transverse and longitudinal septa, constricted at the septa.

Specimen examined: On dead twigs of unidentified tree, Mokokchung, Nagaland, DJ Bhat. 09.07.06, Herb. No. GUBH: AN-14.

Myrothecium roridum Tode, 1790. *Fung. meckelenb, sel.* (Luneburg) 1: 25. (Fig. 32)

Colonies gregarious, greenish. *Conidiophores* sporodochinal, penicillately branched, subhyaline to pale bluish green, 100 – 400 µm wide *Conidiogenous cells* monophialidic, discrete. Conidia aggregated in slimy mass, cylindrical, rounded at both ends, smooth, subhyaline, appearing dark green in mass, aseptate, 6 – 8.5 × 2 – 2.5 µm.

Specimen examined: On dead leaves of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.2006. Herb. No. GUBH: AN-51.

Nigrospora sphaerica (Sacc.) E.W. Mason, 1927. *Trans. Br. mycol. Soc.* 12: 158. (Fig. 33)

Colonies effuse, cottony, grayish brown. *Conidiophores* mononematous, macronematous, branched, hyaline to pale brown, 2-6-septate, 4 – 7 µm wide. *Conidiogenous cells* wedge-shaped, monoblastic. *Conidia* solitary, black, spherical, aseptate, 10 – 16 µm in diam.

Specimen examined: On dead bamboo leaves, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No, GUBH: AN-10.

Periconia byssoides Pers., 1801. *Syn. meth. fung.* (Gottingen): 18. (Fig. 34)

Colonies effuse, hairy, dark brown, velvety. *Conidiophores* mononematous, macronematous, arising individually or in groups, dark brown, 6-9-septate, unbranched, 400 – 1100 × 10 – 15 µm. *Conidiogenous cells* terminal, discrete, polyblastic. *Conidia* arising in chains, brown, spherical, aseptate, verrucose, 8 – 16 µm in diam.

Specimen examined: On dead twigs of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-25.

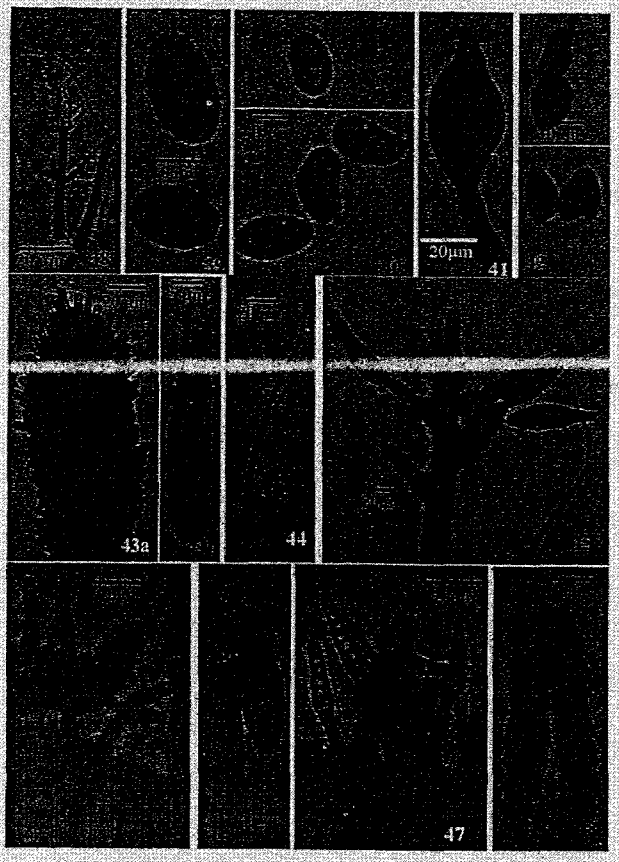
Periconia cookei E.W. Mason & M.B. Ellis. 1953. *Mycol. Pap.* 56: 72. (Fig. 35)

Colonies effuse, cottony, dark brown, velvety. *Conidiophores* mononematous, macronematous, often arising in groups, dark brown, septate, rarely branched, 640 – 730 × 10 – 15 µm. *Conidiogenous cells* polyblastic, discrete, developeing on swollen apical cells. *Conidia* in chains, brown, spherical, verruculose, 7 – 10 µm in diam.

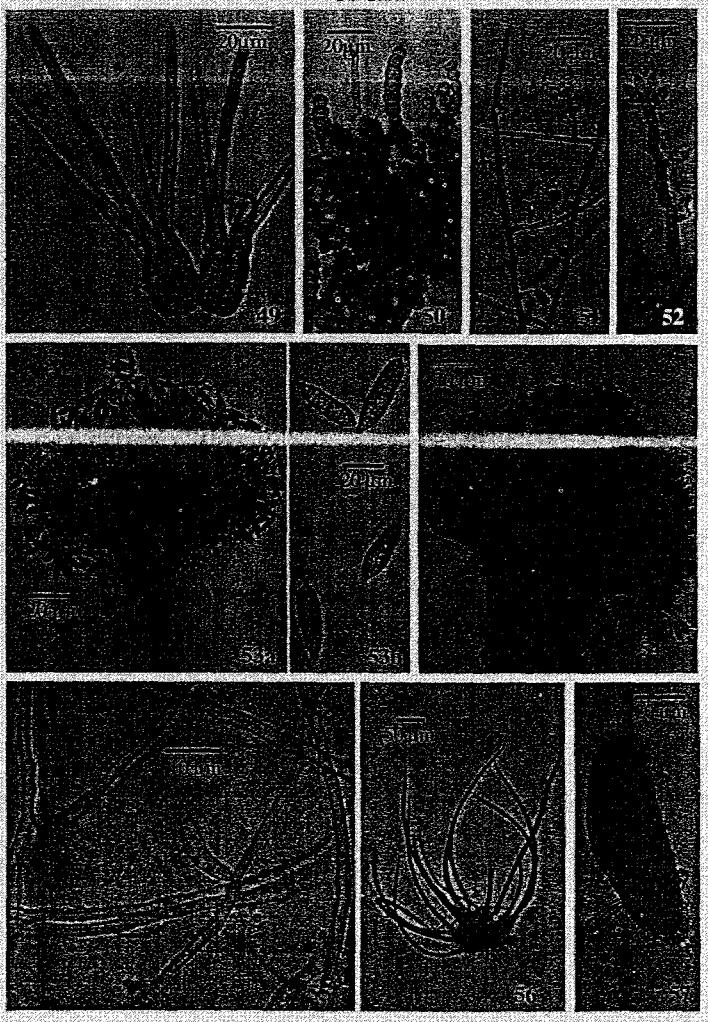
Specimen examined: On dead twigs of unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-30.

Periconia sacchari J.R. Johnst., 1917. In Johnston & Stevenson, *J. Dept. Agric. Porto Rico* 1: 225. (Fig. 36)

Colonies effuse, dark brown, velvety. *Conidiophores* mononematous, macronenatous, arising individually or in groups, dark brown, septate, unbranched, 70 – 100 × 2 – 3.5 µm. *Conidiogenous cells* monoblastic, discrete, formed directly on the



Figs. 38-48. 38. *Phaeostalagmus tenuissimus*; 39. *Pithomyces chartarum*; 40. *Pithomyces graminicola*; 41. *Pithomyces pulvinatus*; 42. *Pithomyces sacchari*; 43. (a), (b) *Podosporium nilgirense* (a) synnemata (b) conidia 44. *Spadicoides verrucosa*; 45. *Sporidesmiopsis malabarica*; 46. (a), (b) *Sporidesmium uapacae* (a) conidiophores., (b) conidia; 47. *Sporidesmium* sp., 48. *Taeniolella stilbospora*.



Figs. 49-57. 49. *Tetraploa aristata*; 50. *Torula herbarum*; 51. *Trichobotrys effusa*; 52. *Vernonaea* sp., 53. (a), (b) *Virgatospora echinofibrosa*, (a) synnemata (b) conidia; 54. *Virgatospora natarajanensis*; 55. *Viittalia indica*; 56. *Wiesneriomyces laurinus*; 57. *Xenosporium africanum*.

swollen apical cells. *Conidia* in chains, brown, spherical, verruculose, 6 – 8.5 µm in diam.

Specimen examined: On unidentified grass culms, Kaziranga Heritage Park, Assam, DJ Bhat, 15.07.06, Herb, No. GUBH-AN-05.

Phaeoisaria clematidis (Fuckel) S. Hughes, 1958. *Can. J. Bot.* **36** 794. (Fig. 37)

Colonies effuse, dark brown. *Conidiophores* synnematous, olivaceous to dark brown, compactly packed, fertile at the tip, septate, 70 – 140 × 2 – 2.5 µm. *Conidiogenous cells* polyblastic, denticulate, [illegible] at the tip. *Conidia* clavate, pointed at the base, hyaline, aseptate, 3 – 6.5 × 1 – 2.5 µm.

Specimen examined: On dead twigs of an unidentifed tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-60.

Phaeostalagmus tenuissimus (Corda) W. Gams & Hol.-Jech., 1976, in Gams & Holubova-Jechova. *Stud. Mycol.* **13**: 93. (Fig. 38)

Colonies effuse, hairy, dark brown. *Conidiophores* mononematous, macronematous, sometimes branched, mid to pale brown, 60 – 120 × 4 – 6 µm. *Conidiogenous cells* monophialidic, verticillately arranged. *Conidia* aggregated in slimy heads, ellipsoidal to cylindrical, rounded at both the ends, slightly allantoid, hyaline, smooth, aseptate, 9 – 10.5 × 3 – 3.5 µm.

Specimen examined: On decaying wild banana leaves, Kaziranga Heritage Park, Assam, DJ Bhat, 15.07.2006, Herb. No. GUBH: AN-81.

Pithomyces chartarum (Berk. & M.A. Curtis) M.B. Ellis, 1960. *Mycol. Pap.* **76**: 13. (Fig. 39)

Colonies effuse, cottony, dark brown. *Conidiophores* semi-macronematous, pale to olivaceous brown. *Conidiogenous cells* terminal, monoblastic. *Conidia* solitary, broadly ellipsoidal, verruculose, dictyoseptate, with 2-4 transverse septa and 2-3 longitudinal septa, olivaceous to dark brown, 16 – 28 × 12 – 16 µm.

Specimen examined: On decaying twigs of an unidentified tree, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-48.

Pithomyces graminicola R.Y. Roy & B. Rai, 1968. *Trans. Br. mycol. Soc.* **51** (1): 154. (Fig. 40)

Colonies effuse, grayish [illegible], velvety. *Conidiophores* micronematous to semi-macronematous, pale to olivaceous brown, smooth. *Conidiogenous cells* terminal, monoblastic. *Conidia* solitary, obovoid to ellipsoidal, reddish brown, smooth, 0-2- transversely septate, 8 – 15 × 5 – 6 µm.

Specimen examined: On decaying twigs of an unidentified plant, Kaziranga Heritage Park, Assam, DJ Bhat, 15.07.06, Herb. No. GUBH: AN-03.

Pithomyces pulvinatus (Cooke & Massee) M.B. Ellis, 1965. *Mycol. Pap.* **103**: 41. (Fig. 41)

Colonies effuse, granular, grayish brown, velvety. *Conidiophores* micronematous to semi-micronematous, pale to olivaceous brown, smooth. *Conidiogenous cells* monoblastic. *Conidia* solitary, irregularly shaped, smooth, multiseptate, dark brown to black, 80 – 120 × 25 – 30 µm, with tapering subhyaline apical end and a protruding, dark colored, truncate basal end.

Specimen examined: On decaying twigs of an unidentified herbaceous plant, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-71.

Pithomyces sacchari M.B. Ellis, 1960. *Mycol. Pap.* 76: 17. (Fig. 42)

Colonies effuse, granular, dark brown. *Conidiophores* micronematous to semi-macronematous, pale to olivaceous brown. *Conidiogenous cells* monoblastic. *Conidia* solitary, clavate, sometimes curved, echinulate, dictyoseptate with 2-3 transverse septa and 0-2 longitudinal septa, olivaceous to dark brown, 18 – 26 × 6 – 10 µm with a protruding truncate, subhyaline base.

Specimen examined: On dead culms of an unidentified grass, Mokokchung, Nagaland, DJ Bhat. 09.07.06, Herb. No. GUBH: AN-31

Podosporium nilgirense (Subram.) M.B. Ellis, 1976. *More Dematiaceous Hyphomycetes* (Kew): 383. (Fig. 43)

Colonies effuse, hairy, dark brown. *Conidiophores* synnematous, mid to dark brown, compactly arranged, branched, 740 – 900 × 24 – 40 µm. *Conidiogenous cells* monotretic terminal, sometimes recurved. *Conidia* solitary, obclavate, rounded at the apex, truncate at the base, olive brown, smooth, 3-6-septate, 60 – 64 × 6 – 8.5 µm.

Specimen examined: On dead bamboo culms, Mokokchung, Nagaland, DJ Bhat, 09.07.2006, Herb. No. GUBH: AN-17.

Podosporium rigidum Schwein., 1832, *Trans. Am. phil. Soc.*, Ser. 2 4(2): 278.

Colonies effuse, hairy, dark brown. *Conidiophores* macronematous, synnematotus, mid to dark brown, branched, 600 – 1000 × 30 – 50 µm. *Conidiogenous cells* monotretic, terminal, precurrently proliferating. *Conidia* solitary, obclavate rounded at the apex, truncate at the base, pale to olivaceous brown, smooth, 4-8-septate, 45 – 70 × 12 – 15 µm.

Specimen examined: On dead twigs of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.2006 Herb. No. GUBH: AN-16.

Sarocladium oryzae (Sawada) W. Gams & D. Hawks., 1975, *Kavaka* (1976) 3: 58.

Colonies effuse, dark brown. *Conidiophores* mononematous, macronematous, profusely branched, smooth, hyaline, 80 – 120 × 2 – 4 µm. *Conidiogenous cells* monophialidic, discrete. *Conidia* in slimy aggregates, ellipsoidal to cylindrical, variable in size, 1.5 – 2 × 3 – 3.5 µm long.

Specimen examined: On dead twigs of an unidentified tree, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.2006, Herb. No. GUBH: AN-37.

Spadicoides verrucosa V. Rao & de Hoog, 1986. *Stud. Mycol.* 28: 42. (Fig. 44)

Colonies effuse, hairy, dark brown. *Conidiophores* mononematous, macronematous, pale brown, subhyaline at the apex, unbranched, 70 – 170 × 2 – 3 µm. *Conidiogenous cells* polytretic, intercalary, integrated. *Conidia* solitary, ovoid, subhyaline to pale brown, minutely verruculose, aseptate, 3 – 4.5 × 2 – 2.5 µm.

Specimen examined: On bark of unidentified tree, Namdapha National Park, Arunachal Pradesh, DJ Bhat, 13.07.2006, Herb No. GUBH: AN-75.

Sporidesmiopsis malabarica Subram. & Bhat, 1987, *Kavaka*, 15(1,2): 71. (Fig. 45)

Conidiophores macronematous, mononematous, dark brown to black, branched at the apex, 230 – 500 × 8 – 10.5 µm. Conidiogenous cells monoblastic, terminal, percurrent, Conidia solitary, obclavate, smooth, dark brown, 70 – 100 µm long, 15 – 20 µm in the broadest region, with several transverse pseudosepta.

Specimen examined: On dead twigs of unidentified tree, Mokokchung, Nagaland, coll. by DJ Bhat, 09.07.06, Herb. No. GUBH: AN-29

Sporidesmium uapacae M.B. Ellis, 1958. *Mycol. Pap.* 70: 77. (Fig. 46)

Colonies effuse, hairy, dark brown, velvety. *Conidiophores* mononematous, macronematous, olivaceous to dark brown, 2-4-septate, unbranched, 20 – 45 × 4 – 6 µm. *Conidiogenous cells* monoblastic, terminal, determinate. *Conidia* solitary, obclavate, smooth, olivaceous to dark brown, with several transverse pseudosepta, acute at the tip, 35 – 45 × 4 – 8.5 µm.

Specimen examined: On decaying culms of unidentified grass, Kaziranga Heritage Park, Assam, DJ Bhat, 15.07.06, Herb. No. GUBH: AN-01.

Taeniolella stilbospora (Corda) S. Hughes, 1958, *Can. J. Bot.* 36: 817. (Fig 48

Colonies effuse, dark brown, velvety. *Conidiophores* micronematous, olivaceous brown. *Conidiogenous cells* monoblastic, terminal. *Conidia* , solitary, cylindrical, rounded at the apex, olivaceous to dark brown, verrucose, 2-8-septate, constricted at the septa, 14 – 52 × 12 –14 µm.

Specimen examined: On dead twigs of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-21

Tetraploa aristata Berk. & Broome, 1850. *Ann. Mag. nat. Hist.*, Ser. 2 5: 459. (Fig. 49)

Colonies effuse, dark brown, granular, velvety. *Conidiophores* micronematous. *Conidiogenous cells* monoblastic. *Conidia* solitary, sub-hyaline to pale brown, verrucolose, muriform, with cells arranged in 4 rows, appendaged, 14 – 25 × 12 – 18 µm, appendages multiseptate, setiform, diverging from one another, 50 – 84 × 4 – 6 µm.

Specimen examined: On unidentified grass culms, Kaziranga Heritage Park, Assam, DJ Bhat, 15.07.06. Herb. No. GUBH: AN-06.

Torula herbarum (Pers.) Link, 1809. *Magazin Ges. naturf. Freunde, Berlin* 3: 9. (Fig. 50)

Colonies effuse, dark brown, granular, velvety. *Conidiophores* semi-macronematous, subhyaline to midbrown. *Conidiogenous cells* polyblastic, collapsing on secession of conidia. *Conidia* in chains, cylindrical with rounded ends, olivaceous to mid brown, echinulate, 2-5 septate, constricted at the septa, 20 – 60 × 6 – 9 µm.

Specimen examined: On decaying leaves of an unidentified tree, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb. No. GUBH: AN-46.

Trichobotrys effusa (Berk. & Broome) Petch, 1924. *Ann. R. bot. Gdns Peradeniya* 9: 169. (Fig. 51)

Colonies effuse, cottony, dark brown, velvety. *Conidiophores* mononematous, macronematous, narrow, long, olivaceous to dark brown, verrucose, setiform at the tip. *Conidiogenous cells* polyblastic, intercalary. *Conidia* in basipetal chains, globose, olivaceous brown, minutely verruculose, aseptate, 4 – 4.5 µm in diam.

Specimen examined: On dead and decaying bamboo leaves, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-08.

Virgatospora echinofibrosa Finley, 1967. *Mycologia* 59: 538. (Fig. 53)

Colonies effuse, dark brown. *Conidiophores* synnematous, dark brown to black, compact at the base, flared at the tip, branched, 850 – 1000 µm long, 50 – 60 µm wide in the stipe region. *Conidiogenous cells* monophialidic, terminal, discrete, verrucose. *Conidia* aggregated in slimy heads, ellipsoidal, with a rounded protruding beak at both ends, dark brown, with distinct

longitudinal striations, 3-septate, 35 – 45 x 9.5 – 10.5 µm.

Specimen examined: On dead twigs of an unidentified tree, Mokokchung, Nagaland. DJ Bhat, 09.07.2006, Herb. No. GUBH: AN-27.

Virgatospora natarajanensis D'Souza, Singh & Bhat, 2002, *Mycotaxon* **82**: 133-143. (Fig. 54)

Colonies effuse, dark brown. *Conidiophores* synnematous, pale brown at the base, dark brown to black at the apex, 700 – 850 µm long, 45 – 65 µm wide in the stipe region. *Condiogenous cells* monophialidic, terminal, discrete, verrucolose. *Conidia* aggregated in slimy heads, fusiform, dark to greenish brown, distinct longitudinal striations, uniseptate, 8 – 8.5 x 3 – 3.5 µm.

Specimen examined: On dead and decaying bamboo leaves, Mokokchung, Nagaland, DJ Bhat, 09.08.2006, Herb. No. GUBH: AN-26.

Vittalia indica Gawas & Bhat, 2007. *Mycotaxon* **100**: 295-303. (Fig. 55)

Colonies effuse, floccose, grayish. Conidiophores macronematous, mononematous, long, flexouus, subhyaline to pale brown, smooth, septate, branched, indistinguishable from the mycelium, 2 – 3.5 µm wide. Conidiogenous cells monotretic, non-cicatrized, intercalary, smooth, subhyaline, Conidia fusiform, curved, rounded at both ends, 3-euseptate, verruculose, pale brown, 11-14 (sometimes up to 19) x 3 – 4.5 µm.

Specimen examined: On dead twig of unidentified tree, Tezu, Arunachal Pradesh, coll. by DJ Bhat, 13.07.06, Herb. No. GUBH: AN-50, HCIO 46950.

Wiesneriomyces laurinus (Tassi) P.M. Kirk, 1984. *Trans. Br. mycol. Soc.* 82(4): 748. (Fig. 56)

Colonies sporadic, dark brown, velvety. *Conidiophores* sporodochial, macronematous, setaceous, olivaceous grey. Setae long, septate, smooth, inwardly curved, dark brown to black, pointed at the apex and swollen at the base, 200 – 400 x 4 – 7.5 µm. *Conidiogenous cells* polyblastic, denticulate. *Conidia* in unbranched chains attached to one another through a narrow isthmi, forming slimy aggregates, hyaline, smooth, on cessation oliiform, aseptate, 10 – 12 x 3.5 – 4.5 µm

Specimen examined: On dead twigs of an unidentified tree, Mokokchung, Nagaland, DJ Bhat, 09.07.06, Herb. No. GUBH: AN-12

Xenosporium africanum Piroz., 1966. in Deighton & Pirozynski, *Mycol. Pap.* 105:. 33. (Fig.57)

Colonies effuse, dark brown, velvety. *Conidiophores* mononematous, micronematous, unbranched, olivaceous to dark brown. *Conidiogenous cells* monoblastic, terminal. *Conidia* solitary, slightly curved, olivaceous to dark brown, smooth, muriform, 45 – 65 x 22 – 35 µm, bearing secondary conidia. Secondary conidia, solitary, spherical, pale to olivaceous brown, smooth, muriform, 18 – 24 µm in diameter.

Specimen examined: On decaying twig of an unindentified tree, Tezu, Arunachal Pradesh, DJ Bhat, 13.07.06, Herb No. GuBH: AN-68.

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