Fungal Hyphal Aggregate

Terminology for Basic Tissue-like Organization of Fungi

Plectenchyma - a hyphal aggregation that appears tissue-like, but are not because formed from hyphae not cells (2 types)

Prosenchyma - a plectenchyma having hyphae that remain obvious at structure's maturity

Pseudoparenchyma - a plectenchyma having hyphal origin obscurred at maturity of structure.

Hyphal coordination yielding multi-hyphal aggregates is manifested by:

a) interhyphal contacts and fusions causing formation of plectenchyma

b) coordinated differentiation with neighboring hyphae

c) ultimate formation of morphologically distinctive, nearly macroscopic to truly macroscopic structures.

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Vegetative Hyphal Aggregates*

I. Strands -

linear hyphal aggregates with the capacity to extend unidirectionally

A. Mycelial Strands -
retain hyphal organization at maturity

B. Rhizomorphs -
aggregates formed by coordinated apical extension of a number of aggregated hyphal tips

*vs reproductive

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Characteristics of Strands

a) Thickness is variable (e.g. a few hyphae to several mm)

b) Can arise either from a colony or a sclerotium

c) Potentially capable of unlimited <u>linear α</u> extension

d) Give rise to new colonies or to a reproductive structures

f) Most often associated with the production of reproductive bodies (e.g. basidiocarps)

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II. Sclerotia*

Firm hyphal aggregates of vegetative hyphal origin, which exhibit determinent growth.

*"hard time structures"

Characteristics

1. Have many sizes and shapes
2. Often rounded or lobed
3. Can be as lg as 10 cm in diameter
4. Usually darkly pigmented
5. Often exhibit pseudoparenchymatous construction and much anastomosis
6. "Cells" contain large concentrations of stored endogenous substrates

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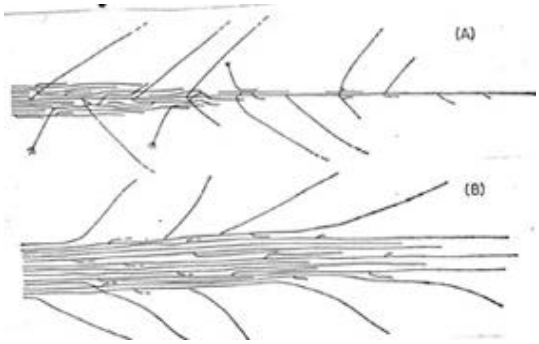
Asexual Reproductive Hyphal Aggregates*

	sing	**pl**
I	Synnema	Synnemata
II	Pycnidium	Pycnidia
III	Acervulus	Acervuli
IV	Sporodochium	Sporodochia

*aggregates that are associated with conidium production

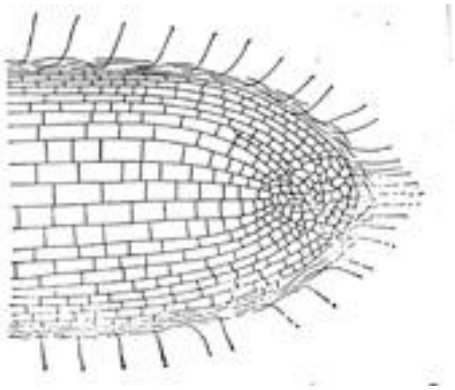
How formed:

I Mycelial strands



Main hypha is "adopted" by so-called "following hyphae" that have branches that can grow backwards or forward.

II. Rhizomorphs



Coordinated apical extension of a # of hyphal tips

320/165b'

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1. Synnema – a simple structure that results when conidiophores aggregate

    a. Often appear more complex than they really are

    b. Often macroscopic and mistaken for slime mold fruit bodies

    c. Often conidiophores exhibit extensive anastomosis

    d. Such fungi usually members of Fungi Imperfecti* or anamorphs of Ascomycota

* Hyphomycetes - form class

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Conidioma of Coelomycetes

2. Pycnidium - a flask-shaped, globose or oval-shaped structure that looks like a cleistothecium or a perithecium but has a cavity filled with conidiophores and conidia instead of asci- and ascospores.

Often identified incorrectly as an ascocarp.

3. Acervulus* - functionally a structure similar to a pycnidium, but structurally different by being formed by hyphae of plant pathogenic fungi in association with plant tissue.

* Often appears to be a pustule formed just under plant epidermis, which erupts and exudes conidia

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Conidioma (continued)

4. Sporodochium - large mass of short conidiophores and hyphae which arise together from the surface of a structure (multihyphal aggregate) called a stroma (stromata).*

* Structures like those in which locuoles are sometimes formed by Loculoascomycetes.

* Stroma can give rise to:
1. conidia
2. locuoles & asci
3. sclerotia

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Sexual Reproductive Hyphal Aggregates*

*Carpophores** of Euascomycotina

	name	class association
1.	cleistothecia	Plectomycetes
2.	perithecia	Pyrenomycetes, Laboulbeniomycetes
3.	apothecia	Discomycetes
4.	ascostroma	Loculomycetes

** Ascocarp-type carpophores***
*Ascomas

*** a) formed from pseudoparenchymatous tissue derived from the ascogonium
b) from primary protective tissue derived totally from parent hyphae
c) secondary protective tissue formed only after stimulation of ascogonium

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Sexual Hyphal Reproductive Aggregates* (continued)

Basidiocarps

formed by:

1. Localized & coordinated branching and swelling of aggregated hyphae (usually dikaryotic)

2. Secondarily by hyphal compaction, wall thickening, gelatinization and coloration

3. Basidiocarp development seems to be triggered by environmental conditions, since dikaryotic colonies may grow indefinitely without producing a basidiocarp

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Basidiocarp Developmental Patterns among some Hymenomycetes (Homobasidiomycotina)

1. Gymnocarpic*
   primordium develops into a gilled mushroom-like structure in such a way that basidia are always exposed during formation**

* as in Aphyllophorales

** as per *S. commune*

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Basidiomycete developmental patterns leading to mushrooms (continued)

Agaricales

Hemiangiocarpic
gills and basidia of mushroom develop in "hidden" fashion, although mushroom development is apparent

Angiocarpic
mushroom development is not obvious until mushroom is relatively mature; gills again hidden.

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Review of Holobasidiomycotina
Classes and Orders

Subphylum - Holobasidiomycotina

Class - Phragmobasidiomycetes* (5 orders)

Order - Tremellales
(have cruciately septate Basidia)

Order - Auriculariales
(have transversely septate Basidia)

* have septate basidia

Class – Holobasidiomycetes (27 orders)**

Order - Dacrymycetales
(have tuning-fork type basidium)

Order - Tulasnellales (have holobasidia with swollen sterigmata)

** All but these two have typical holobasidia

Basidiomycota Classification (cont.)

Subphylum - Holobasidiomycotina * (cont.)

Class – Holobasidiomycetes (selected orders cont.)

Order - Agaricales (the mushrooms)

Order – Boletales (the fleshy pore fungi)

Order – Cantharelles (chantarelles, and tooth fungi, etc.)

Order - Exobasidials

Order - Gautieriales

Order - Hymenogastrales

Order - Lycoperdales (the puffballs, earth stars, etc.)

Order - Melanogastrales

Order - Nidulariales (the bird's nest fungi)

Order - Phallales (the stinkhorns)

Order - Porales (woody shelf fungi or woody bracket fungi)

Order – Thelephorales (the coral and leather fungi)

Order – Sclerodermatales (the earth balls)

* most have typical holobasidum, but different kinds of basidiocarps