



## Definitions of Fungal Terms

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**2-D** - used here to describe helicoconidia/helicospores that coil in two dimensions.

**3-D** - used here to describe helicoconidia/helicospores that coil in three dimensions.

**ABSCISSION** - separation, as of conidia from a conidiogenous cell or conidiophore (see schizolytic, rhexolytic)

**ACERVULAR CONIDIOMA (ACERVULUS)** - a flat, covered, spore-producing structure developed by Coelomycetes; often subcuticular or subepidermal in plant tissue. The covering is of host material, and splits open at spore maturity.

**ACROPETAL** - describes chains of conidia in which the youngest conidium is at the tip of the chain; a pattern of apical growth.

**AERO-AQUATIC FUNGI** - pond-inhabiting fungi producing elaborate floating propagules which are on hand to colonize autumn-shed leaves as they fall into the water, then `condition' them in near-anaerobic conditions at the bottom of the pond (cf. AMPHIBIOUS fungi).

**AEROBIC** - requiring free oxygen for respiration.

**AEROBIOLOGY** - the study of fungal (and other) propagules in the atmosphere. This has particular relevance for plant pathologists and for people with respiratory allergies.

**AFLATOXIN** - virulent toxin produced by the hyphomycetes, *Aspergillus flavus* and *A. parasiticus*, growing on foodstuffs, esp. nuts: highly carcinogenic.

**AGAR** - phycocolloid produced by the red alga, *Gelidium*; used to solidify culture media used in mycology and bacteriology.

**AGARIC** - a gill- or tube-bearing mushroom of the order *Agaricales (Holobasidiomycetes)*.

**ALIMENTARY TOXIC ALEUKIA (ATA)** - a mycotoxicosis caused by T-2 toxin (q.v.) which killed many people in Russia during and after World War II.

**ALLANTOID** - sausage-shaped.

**ALLERGY** - hypersensitivity, often to external agents such as fungal spores (as well as pollen, pet dander, dust mites, etc.) in which mast cells of the immune system initiate inflammation.

**ALTERNATE-ARTHRIC** - a mode of arthric conidiogenesis in which intervening cells are lost when intercalary conidia develop.

**AMEROSPORES** - non-septate (single-celled) spores, such as those of *Penicillium*, *Aspergillus*, *Trichoderma*.

**AMPHIBIOUS FUNGI** - specialized stream-inhabiting, leaf-colonizing fungi which have aquatic anamorphs often producing tetra-radiate conidia (q.v.), and, in many cases, emergent or terrestrial teleomorphs.



**AMYLOID** - turning blue in iodine (Melzer's reagent, q.v.), reacting like starch, as do many ascus tips, basidiospore walls or ornamentations; I<sup>+</sup>.

**ANAMORPH** - the asexual reproductive manifestation of a fungus: usually produces conidia, but may also produce chlamydospores, bulbils or sclerotia, or no spores at all.

**ANASTOMOSIS** - fusion of somatic hyphae; characteristic of ascomycetes and basidiomycetes.

**ANNELLIDIC** - describes blastic conidia produced in sequence by short percurrent extensions of a conidiogenous cell, which leave annular scars (annellations) on the cell.

**ANTIBIOTIC** - a diffusible substance produced by one microorganism that is damaging to others, thereby conferring a competitive advantage on the producer. Penicillin, derived from *Penicillium chrysogenum*, was the first antibiotic to be mass-produced.

**APICULATE** - having an apiculus, a small pointed projection at the tip or base.

**APIOSPOROUS** - didymospores in which one cell is much larger than the other, e.g. *Acumispora*, *Chlamydomyces*, *Mycogone*, *Polythrincium*.

**APPLE SCAB** - disfiguring disease of apple leaves and fruit caused by the *Spilocaea pomi* anamorph of *Venturia inaequalis* (Dothideales: Ascomycetes).

<C:\Users\Chris\Documents\mrz18.jpg> **ARTHURIC** - describes thallic conidia which form by the breaking up of fertile hyphae at the septa.

**ASCOMYCETES** - see *ASCOMYCOTA*.

**ASCOMYCOTA** - phylum of true fungi; form endogenous meiospores in asci and have a restricted dikaryon; generally called Ascomycetes. Many, but not all, have anamorphs.

**ASCOSPORE** - meiospore produced in an ascus; usually 8 per ascus (though the number can also be 1, 2, 3, 4, 16, 32, 64, 128, 256, 512, 1024 and 2048)

**ASCUS** (pl. = ASCI) - the meiosporangium of the Ascomycetes: originally evolved as a spore-gun in terrestrial environments.

**ASEPTIC** - free or freed from contaminating organism(s); (of microbiological technique) pertains to working under sterile conditions and using sterile techniques, e.g., working in a laminar flow bench, using flame sterilized inoculating loops and instruments.

**ASEXUAL REPRODUCTION** - a form of reproduction neither preceded nor followed by meiosis; in fungi, commonly involves mitospores, such as sporangiospores or conidia.

**ASPERGILLOID** - with conidiophores resembling those of *Aspergillus*, having a vesicular apical swelling on which conidiogenous cells develop.



**ASPERGILLOMA** - a 'fungus ball' composed principally of hyphae of *Aspergillus*, found in a pre-existing cavity (esp. in an upper lobe of the lung) or a bronchus; usually relatively benign or asymptomatic (cf. ASPERGILLOSIS).

**ASPERGILLOSIS** - any disease in man or animals caused by *Aspergillus* (esp. *A. fumigatus*).

**ATHLETE'S FOOT** - irritation of the skin between the toes caused by dermatophytes (conidial anamorphs of the *Arthrodermataceae*, *Onygenales*: *Ascomycetes*).

**ATOPIC** - susceptible to developing allergies.

**AUTOCLAVING** - sterilization by steam under pressure (15 lb./in<sup>2</sup>) for prescribed time periods; better than dry heat, as sterilization is achieved at lower temperatures (121C).

**AXENIC** - describes a condition in which an organism grows alone, with no other organisms (host, symbionts or parasites) present, as in 'axenic culture'.

**BALLISTOSPORE** - a forcibly discharged spore (e.g., most ascospores and basidiospores, relatively few conidia).

**BASAUXIC** - growing from the base, rather than at the apex.

**BASIDIOMA** (pl. = **BASIDIOMATA**) - any multihyphal structure producing basidia; formed by most basidiomycetes, e.g., mushroom, puffball.

**BASIDIOMYCETES** - see *BASIDIOMYCOTA*.

**BASIDIOMYCOTA** - Phylum of true fungi forming exogenous meiospores on basidia, and having an extended dikaryophase; generally called Basidiomycetes.

**BASIDIOSPORES** - exogenous meiospores produced on a basidium; usually 4 per basidium.

**BASIDIUM** - the meiosporangium of the phylum *Basidiomycota*; produces exogenous meiospores (usually 4, sometimes more, occasionally 2) on special projections called sterigmata.

**BASIPETAL** - describes a chain of conidia to which new units are added at the base (cf. ACROPETAL).

**BINOMIAL (or BINOMINAL)** - the unique double name given to each known species: composed of generic epithet and a species, or 'trivial', epithet.

**BIOCONTROL** - the control of undesirable organisms by other organisms.

**BITUNICATE** - describes a type of ascus with two distinct, persistent wall layers: the 'jack-in-a-box' ascus that is diagnostic of a large group of ascomycetes and is found in pseudothecial ascomata (cf. UNITUNICATE).

**BLASTIC** - one of two basic modes of conidium development: there is marked enlargement of a recognizable conidium initial before the initial is delimited by a septum; derived from budding (cf. THALLIC).

**BLASTOMYCOSIS** - a disease in man caused by *Blastomyces dermatitidis* (holomorph is *Ajellomyces dermatitidis*).

**BLIGHT** - a general name for many diseases of plants esp. when leaf damage is sudden and serious, e.g., early blight (*Alternaria solani*).

**BLUE CHEESES** - cheeses ripened and flavoured by *Penicillium roquefortii* (Hyphomycetes), e.g., Roquefort,

Stilton, Gorgonzola, Danish Blue.

**BLUE MOULD** - downy mildew disease of tobacco, caused by *Peronospora tabacina* (*Peronosporales: Oomycota* - which are not true fungi).

**BLUE STAIN** - a blue-grey colouration of worked wood paradoxically caused by the growth of brown fungal hyphae, often those of *Ophiostoma* and its anamorphs, inside the wood cells.

**BUDDING** - a process of growth or multiplication by development of a new cell from a small outgrowth of the parent cell (cf. BLASTIC).

**BULBIL** - a small sclerotium-like structure of relatively few cells.

**CANDIDIASIS** - a disease of man and animals caused by species of *Candida*, esp. *C. albicans*; also called moniliasis and candidosis.

**CELL** - a unit of protoplasm containing a functional genome and often enclosed by a wall.

**CELLULASE** - an enzyme that can degrade cellulose; a cellulolytic enzyme; produced by such hyphomycetes as *Stachybotrys* and *Trichoderma*.

**CELLULOSE** - principal polysaccharide of plant cell walls; a polymer of glucose; walls of Oomycetes are partly composed of a similar substance called 'fungal cellulose'.

**CHEIROID** - describes spores in which several to many columns of cells arise from a common origin and grow parallel or diverge moderately.

**CHITIN** - the principal polysaccharide in cell walls of most fungi (but not *Oomycota*); a polymer of N-acetylglucosamine.

**CHLAMYDOSPORE** - an often thick-walled, resistant mitospore, formed by many fungi. Unlike conidia, chlamydospores are persistent, not being liberated by a built-in dehiscence mechanism (see SCHIZOLYTIC, RHEXOLYTIC).

**CHROMOBLASTOMYCOSIS** - fungal skin disease of humans caused by species of *Phialophora* (Hyphomycetes).

**CLADE** -

**CLAMP CONNECTION** - a lateral link between adjoining cells in a dikaryotic hypha; a short, backwardly directed hyphal outgrowth that permits simultaneous division of both nuclei, subsequently anastomosing with the parent hypha, developing a septum, and thus segregating a compatible pair of nuclei in each of the ultimate and penultimate cells, to maintain the dikaryon. Found in some basidiomycetous anamorphs.

**CLASS** - taxonomic rank above order, but below subphylum; formal suffix in fungi is **-mycetes, though this ending is often used informally** (hyphomycetes, coelomycetes, basidiomycetes, ascomycetes)

**CLASSIFICATION** - the systematic arrangement of organisms, based on everything we know about them. Classifications tend to change as we learn more about organisms.

**CLATHROID** - describes multicellular propagules that are more or less hollow spheres, made up of an anastomosing network of cells, as in *Clathrosphaerina*.

**CLEISTOTHECIAL ASCOMA (CLEISTOTHECIUM)** - an ascoma, which is closed at maturity; the unitunicate but frequently evanescent asci are often spherical and are not arranged in an hymenium; characteristic of *Eurotiales*. Cleistothecia of teleomorphs often occur with anamorphs such as *Aspergillus*.

**CLEISTOTHECIUM** - see CLEISTOTHECIAL ASCOMA.

**COCCIDIOIDOMYCOSIS** - deep-seated mycosis caused by *Coccidioides immitis* (hyphomycetes); common in dry S.W. of U.S.A.

**COELOMYCETES** - anamorphic (asexual) Ascomycotan or Basidiomycotan fungi in which the conidia are produced within a protective structure, an acervular or pycnidial conidioma, or some intermediate covered fructification..

**COLLARETTE** - the often flaring wall of a phialide distal to the conidiogenous locus.

**COLONY** - a discrete mycelium of a fungus, often derived from a single spore. Young colonies are usually either circular (if growing on the surface of a substrate) or spherical (if in a liquid medium), but may become very extensive, as in the humungous fungus.

**COMPOUND ASCOMA** - a teleomorphic fructification incorporating several to many distinct ascomata on or in a single structure, as in the *Clavicipitales* and *Xylariales*.

**CONIDIA** - see CONIDIUM.

**CONIDIAL FUNGI** - those anamorphic expressions of Ascomycetes or Basidiomycetes which form CONIDIA (q.v.). Most MOULDS belong here. Some have no TELEOMORPH and are effectively ANAMORPHIC HOLOMORPHS.

**CONIDIATION** - the process of producing conidia.

**CONIDIOGENESIS** - the process by which individual conidia develop; see also: ACROPETAL, ANELLIDIC, ARTHRIC, BASIPETAL, BLASTIC, PHIALIDIC, RETROGRESSIVE, SYMPODIAL, SYNCHRONOUS, THALLIC.

**CONIDIOGENOUS** - giving rise to conidia; often refers to specialized cells such as phialides.

**CONIDIOMA** (pl. = CONIDIOMATA) - any multihyphal structure producing conidia, e.g., synnematal, sporodochial, acervular or pycnidial conidiomata.

**CONIDIOPHORE** - a specialized hypha, simple or branched, on which conidia are formed, or which bears conidiogenous cells.

**CONIDIUM** (pl. = CONIDIA) - a non-motile fungal mitospore not formed inside a sporangium; typical of ascomycotan and basidiomycotan anamorphs.

**COPROPHILOUS FUNGI** - fungi living on dung; include many zygomycetes, hyphomycetes, ascomycetes and basidiomycetes.

**CROSS-WALLS** - SEPTA (q.v.)

**CRYPTOCOCCOSIS** - a systemic mycosis caused by a basidiomycetous yeast, *Cryptococcus neoformans* (holomorph is *Filobasidiella neoformans*).





**CRYPTOGAM** - a plant, fungus, or chromistan that propagates by spores rather than by seeds (most fungi, algae, bryophytes, ferns).

**CUP FUNGUS** - a 'discomycete' - any ascomycete with an open, shallow, cupulate apothecial ascoma; a heterogeneous grouping because the asci may be unitunicate operculate, unitunicate inoperculate, or in many lichens, bitunicate. May produce anamorphs.

**CUPULATE** - cup-shaped, as in the collarete of some phialides.

**CYCLOSPORINE** - a cyclic polypeptide, produced by the hyphomycete, *Tolypocladium niveum*; used as an effective partial immunosuppressant after organ transplantation, leaving the patient with some defences against infections.

**CYTOPLASM** - all the living contents of the cell, except the nucleus.

**DAMPING-OFF** - a rotting of seedlings at soil level; commonly caused by species of *Fusarium*, and *Rhizoctonia* (plus *Pythium* and *Phytophthora* - not true fungi)

**DECIDUOUS** - falling off, as leaves that are shed in the autumn; used to describe the easily dislodged spores of some hyphomycetes.

**DEHISCENCE** - the opening of a structure to permit the escape of spores; the separation of spores from the structure that produced them.

**DENTICLES** - small outgrowths of conidiogenous cells on which conidia are formed, and from which they are liberated, usually by schizolytic secession. Denticles may be broad, narrow, short or long, and pointed or truncate after spore secession.

**DERMATITIS** - non-contagious but often chronic skin inflammation; sometimes caused by fungal infections.

**DERMATOPHYTES** - anamorphs of some *Onygenales* (*Ascomycota*), which live on keratin and can cause skin disease in humans (see MYCOSES, RINGWORM, TINEA).

**DETRITIVORE** - animal which eats organic 'garbage,' dead remains of other life forms.

**DICHOTOMOUS** - describes branching in which the two results are equal (as in a capital Y).

**DICTYOSEPTATE** - having cross-walls running horizontally and vertically, like the layers of cement between bricks (also described as muriformly septate).

**DICTYOSPORES** - spores which are dictyoseptate or muriform (q.v.).

**DIDYMOSPORES** - one-septate spores (i.e., with two cells or compartments).

**DIKARYON** - a nuclear phenomenon unique to phyla *Ascomycota* and *Basidiomycota*, in which compatible nuclei pair off and cohabit without copulating; this phenomenon is restricted to ascogenous hyphae in ascomycetes; but is the dominant phase in basidiomycetes; the paired nuclei always divide synchronously, often giving rise to clamp connections in basidiomycetes.

**DIKARYOTIC** - having two separate but compatible nuclei in each cell or compartment; a nuclear condition unique to the fungi.

**DIMORPHIC** - having two distinct forms, as in some fungal pathogens of humans, which are yeast-like in the

host, but mycelial in culture; also sometimes used to describe sexual dimorphism; having an anamorph and teleomorph; also used to describe anamorphs which develop two distinct kinds of propagule.

**DIPLOID** - having two complements of haploid chromosomes in a single nucleus (a condition often labelled  $2n$ ) (cf. DIKARYOTIC).

**DISCOMYCETES** - cup fungi; an informal grouping of ascomycetes which mostly form unitunicate asci in apothecial ascomata, though many lichenized taxa have bitunicate or archaeasceous asci. Some produce anamorphs, some do not.

**DISTOSEPTATE** - spores (ascospores or conidia) in which there appears to be a thick inner wall within a thinner outer wall; the inner wall often significantly reduces the volume of the lumen. Common in bitunicate ascomycetes and their anamorphs.

**DNA (DEOXYRIBOSE NUCLEIC ACID)** - principal carrier of genetic information in living organisms; composed of chains of phosphate, sugar molecules (deoxyribose), purines (guanine and adenine) and pyrimidines (cytosine and thymine); capable of self-replication as well as of determining RNA synthesis.

**DNA SEQUENCING** - determining the actual sequence of bases in parts of DNA or RNA molecules. The first fungus to be fully sequenced was *Saccharomyces cerevisiae* (Dijon et al., 1994. Nature 369:371)

**ENDEMIC** - natural to (always present in) one geographical region.

**ENDOGENOUS** - formed within another structure, as are the meiospores of Ascomycetes. Conidia also sometimes form within hyphae (cf. EXOGENOUS).

**ENDOPHYTIC FUNGI** - fungi (such as some anamorphs of *Clavicipitales*, e.g., *Neotyphodium*) which grow systemically within plants without causing symptoms; now known to produce neurotoxins that discourage herbivores, and therefore to be participating in a mutualistic symbiosis.

**ENTOMOGENOUS** - living in or on insects, esp. as pathogens.

**ENTOMOPATHOGENIC** - causing disease in insects.

**ENZYME** - a protein that, even in low concentration, speeds up (catalyzes) specific chemical reactions; usually becomes inactivated or unstable at high temperatures; name usually derived from substrate or function, with suffix **-ase**; see AMYLASE, CELLULASE, DNA LIGASE, PROTEASE, RESTRICTION ENDONUCLEASE. CONSTITUTIVE enzymes are produced even in the absence of the substrate; ADAPTIVE enzymes are not produced until the presence of the substrate has been recognized.

**EPIDEMIC** - (of disease) prevalent and spreading rapidly among many individuals in a population at the same time.

**EPITHET** - one of the words which makes up the binomial of an organism.

**EUKARYOTIC** - having nuclei which are delimited by nuclear membrane, contain an even number of discrete chromosomes, and divide mitotically: the cytoplasm also contains organelles, such as mitochondria (cf. PROKARYOTIC). All fungi are eukaryotic.

**EUMYCOTA** - the Kingdom to which the phyla *Chytridiomycota*, *Zygomycota*, *Basidiomycota* and *Ascomycota* and their anamorphs belong.

**EUSEPTATE** - conidia in which only one wall layer is visible; this may be thick, but does not usually significantly reduce the volume of the cell lumen.

**EVANESCENT** - short-lived, soon disappearing.

**EXOGENOUS** - formed externally to the parent cell, as are the meiospores of basidiomycetes, and most conidia of hyphomycetes.

**FACULTATIVE** - (of a parasite) able to live as a saprobe (cf. OBLIGATE, OPPORTUNISTIC).

**FALCATE** - curved and often tapering to a point at each end.

**FAMILY** - taxonomic group above genus, but below order; suffix is **-aceae**.

**FERMENTATION** - chemical changes in organic substrates caused by enzymes of living microorganisms, e.g., the fermentation of grape juice by yeasts to make wine.

**FOLIAR** - relating to leaves.

**FUNGI** (sing. = FUNGUS) - non-photosynthesizing (i.e., heterotrophic) eukaryotes that produce exoenzymes and absorb their food: usually producing, and living inside, a network of apically extending, branched tubes called hyphae; may belong to Kingdom Chromista or Kingdom Eumycota.

**FUNGICIDE** - an agent designed to kill fungi; may be chemical or biological.

**'FUNGI IMPERFECTI'** - an unfortunate and obsolete name for anamorphic fungi which are, or are suspected to be, the anamorphs of ascomycetes or basidiomycetes; better called 'conidial fungi.' They are no less perfect than the teleomorphs some of them possess.

**GENICULATE** - bent like a knee, often at a point where a conidium has developed; characteristic of many sympodial conidiogenous cells.

**GENOME** - the total genetic material of an organism (chromosomes plus cytoplasmic genes).

**GENOTYPE** - the sum of the genetic potential of an organism: in many fungi only part of this is expressed at any given time (see HOLOMORPH, ANAMORPH, TELEOMORPH).

**GENUS** (pl.= GENERA) - taxonomic rank below family, but above species. One genus may contain from one to thousands of species. All species within a genus are assumed to be closely related, since they share many features, but molecular studies have shown some genera to be heterogeneous - to contain representatives of more than one clade.

**GERM PORE** - a differentiated, thin area, or hollow, in a spore wall through which a germ tube may emerge.

**GERM SLIT** - a thin area of a spore wall running the length of the spore.

**GERM TUBE** - the hypha that emerges from germinating spores of true fungi.

**GLYCOGEN** - an insoluble carbohydrate, similar to starch; a reserve food found in fungi, bacteria and animals.

**GRISEOFULVIN** - a chlorine-containing antifungal antibiotic from *Penicillium griseofulvum*, and *P. nigricans*; has been used as a systemic fungicide against plant pathogens and orally against dermatophyte infections in animals and humans.



**HAMANATTO** - an Oriental food obtained by fermenting whole soybeans with *Aspergillus oryzae*; tao-cho (Malaysia); tao-si (Philippines); tu su (China).

**HAPLOID** - having a single set of chromosomes (often denoted by 'n').

**HAUSTORIUM** (pl. = HAUSTORIA) - in parasitic fungi, a specialized absorptive structure that penetrates the host cell and draws food from it.

**HELICOSPORE** - a spore which curves through more than 180 degrees, and often through several complete gyres, coiling in two or three dimensions.

**HETEROTROPHIC** - unable to derive energy from photosynthesis or from inorganic chemical reactions, and so dependent on energy-containing organic compounds derived from the current or prior existence of other organisms. All fungi are heterotrophs. cf. AUTOTROPHIC.

**HISTOPLASMOSIS** - deep-seated mycosis of humans caused by *Histoplasma capsulatum* (Hyphomycetes); common in the Mississippi Valley.

**HOLOBASIDIOMYCETES** - basidiomycetes in which the basidia are not subdivided by septa (cf. PHRAGMOBASIDIOMYCETES).

**HOLOBASIDIUM** (pl. = HOLOBASIDIA) - a meiosporangium not divided by septa, which usually gives rise to 4 exogenous basidiospores (cf. PHRAGMOBASIDIUM).

**HOLOMORPH** - all manifestations of a genotype: in a fungus this frequently means one or more anamorphs plus teleomorph, but in some cases refers only to the teleomorph, and in others only to an anamorph.

**HOST** - an organism on or in which a parasitic, necrotrophic or symbiotic fungus lives.

**HYALINE** - essentially colourless or transparent.

**HYMENIUM** (pl. = HYMENIA) - fertile layer in fungi; bears asci in ascomata, basidia in basidiomata, conidia in pycnidia or acervuli.

**HYPERPARASITE** - an organism that parasitizes either another parasite, or an organism closely related to itself.

**HYPHA** (pl. = HYPHAE) - the tubular architectural module of almost all fungi, its wall chitinous in eumycotan fungi (but cellulosic in oomycetes).

**HYPHOMYCETES** - conidial anamorphs (mostly ascomycetous, some basidiomycetous) producing exposed conidiophores, not enclosed in any protective structure (cf. COELOMYCETES), and usually liberating CONIDIA in large numbers.

**HYPHOPHORE** - erect, stalked, peltate asexual sporophores in lichens.

**HYPHOPODIA** - specialized outgrowths of hyphae which anchor a fungus to its host; common in leaf-inhabiting fungi.

**INGOLDIAN FUNGI** - see AMPHIBIOUS FUNGI.

**INOCULATE** - to put a microorganism into an organism or a substratum.

**INOCULUM** - a small amount of a fungus used to inoculate fresh culture medium or to infect a host organism.

**INTERCALARY** - among or between cells; refers to such things as non-apical chlamyospores in many fungi, or only slightly modified cells in a hypha that produce or become conidia.

**KATSUOBUSHI** - a Japanese fermented food; cooked bonito fish is fermented by *Aspergillus glaucus* until dry; the product is shaved into ribbons and used for flavouring other foods.

**kb** - kilobases, an abbreviation for 1000 base pairs of DNA.

**KERATIN** - the protein that is the main component of skin, hair, feathers and horns, and is metabolized by some fungi.

**KERATINOPHILIC** - capable of decomposing keratin, as are many of the fungi that cause superficial mycoses in man; see **DERMATOPHYTES**, **RINGWORM**, **TINEA**.

**KETJAP** - an Oriental fermented food; Indonesian soy sauce; black soybeans are fermented for 2-3 days by *Aspergillus oryzae*; the root of the words Ketchup and Catsup.

**KINGDOM** - the highest taxonomic category, of which 7 are currently recognized (*Archaeobacteria*, *Eubacteria*, *Protozoa*, *Chromista*, *Plantae*, *Eumycota*, *Animalia*); all members of Kingdom *Eumycota* are fungi, and two of the phyla in Kingdom *Chromista* are also treated as fungi.

**KOJI** - a 'starter' consisting of *Aspergillus oryzae* cultured on roasted wheat or barley (for hamanatto) or *A. oryzae* or *A. soyae* cultured on rice (for miso), which is then inoculated on the appropriate substrate.

**LD<sub>50</sub>** - LD = lethal dose; LD<sub>50</sub> = that dose which kills 50% of the spores, cells or individuals of the test organism.

**LYOPHILIZATION** - freeze-drying, a technique used to preserve fungal cultures in a state of suspended animation.

**MACROSCOPIC** - big enough to be seen by the naked eye.

**MEDIUM**, culture - a substance or solution for the culture of microorganisms. **DEFINED MEDIUM** -- of a prescribed composition, used for determining the biochemical capabilities of the organism, e.g., auxotrophs; **COMPLETE MEDIUM** -- containing all nutrients required for growth; **MINIMAL MEDIUM** -- the simplest chemically defined medium on which the wild type (prototroph) of a species will grow and which must be supplemented by one or more specific substances for the growth of auxotrophic mutants derived from the wild type; **SELECTIVE MEDIUM** - medium containing certain chemical components which restrict the growth of some microorganisms but encourages the growth of others.

**MEIOSIS** - reduction division: a diploid nucleus produced (usually) 4 haploid nuclei by 2 successive nuclear divisions in which the chromosome number is halved from diploid (2n) to haploid (n), and genetic segregation and recombination occur. This happens in teleomorphs but not in anamorphs.

**MEIOSPORANGIUM** (pl. = **MEIOSPORANGIA**) - a sporangium within which meiosis occurs before spore formation (e.g., basidium, ascus); produces meiospores. (cf. **MITOSPORANGIUM**).

**MESOPHILIC** - describes organisms which grow at temperatures between 10-40C (opt. 20-35C) (cf. **PSYCHROPHILIC**, **THERMOPHILIC**).

**METABOLISM** - the sum of all chemical processes occurring within a living cell or organism; **PRIMARY**

**METABOLISM** -- metabolism associated with the normal maintenance and growth of the organism;  
**SECONDARY METABOLISM** -- processes which use primary metabolites available after growth has ceased, producing substances with no known role in primary metabolism.

**METULAE** - special cells at the apex of a complex conidiophore which support conidiogenous cells, as in many species of *Penicillium*, *Leptographium*.

**mg** - see MILLIGRAM.

**MICRON** - one-thousandth of a millimetre or one-millionth of a metre: written as `m'.

**MICROPORES** - extremely narrow connectives penetrating the septa of some mycelial yeasts, e.g. *Geotrichum*.

**MILLIGRAM** - one-thousandth of a gram, one millionth of a kilogram.

**MISO** - an Oriental food product, used for soups and as flavouring agent, composed of rice and cereals + soybeans fermented by *Aspergillus oryzae* and *Saccharomyces rouxii*.

**MITOCHONDRIA** - intracellular organelles concerned with the Krebs cycle and electron transport: the chief source of ATP in non-photosynthesizing cells.

**MITOSIS** - nuclear division involving chromosomes that are replicated and distributed equally between the daughter nuclei. (cf. MEIOSIS)

**MITOSPORE** - a spore receiving a nucleus or nuclei resulting from mitotic division; characteristic of asexual reproduction; see CONIDIUM, ZOOSPORES, MITOSPORANGIUM.

**MOLDS** - see MOULDS.

**MONILIOID** - describes closely-septate hyphae with swollen cells, constricted at the septa.

**MONOBLASTIC** - having only one conidiogenous locus (or) producing only one conidium per conidiogenous locus ??

**MONOKARYON** - in ascomycetes and basidiomycetes, the haploid phase in which the hyphae contain only one kind of nuclei (cf. DIKARYON).

**MONOTRETIC** - having only one pore-like conidiogenous locus on a conidiogenous cell (or) each conidiogenous locus producing only one tretic conidium

**MONOVERTICILLATE** - having a single whorl of conidiogenous cells.

**MOULDS** - microscopic fungi, usually hyphomycetes, sometimes zygomycetes, occasionally ascomycetes, associated with deterioration of food or manufactured goods of organic origin.

**MUCILAGINOUS** - composed of mucilage.

**MUSCARDINE DISEASES** - diseases of certain insects, esp. silkworms, caused by hyphomycetes; **GREEN MUSCARDINE** -- *Metarhizium anisopliae*; **WHITE MUSCARDINE** -- *Beauveria bassiana*; **YELLOW MUSCARDINE** -- *Paecilomyces farinosus*.

**MYCELIUM** (pl. = MYCELIA) - collective term for numerous hyphae which constitute the assimilative thallus of a fungus, excluding organs of sporulation or sclerotia.



**MYCOHERBICIDE** - a preparation of phytopathogenic fungi used to kill weeds.

**MYCOINSECTICIDE** - a preparation of entomopathogenic fungi used to kill insects.

**MYCOLOGY** - the study of fungi.

**MYCOPARASITE** - a fungus which attacks other fungi (sometimes called HYPERPARASITE).

**MYCOSES** (sing. = MYCOSIS) - diseases of humans or animals caused by fungi (e.g., ringworm, histoplasmosis, coccidioidomycosis, athlete's foot).

**MYCOTOXINS** - fungal secondary metabolites which contaminate food and are poisonous to animals and humans. Many hyphomycetes produce them (examples of mycotoxins produced by hyphomycetes are aflatoxin, satratoxin, PR toxin.)

**NECROSIS** - death of cells or tissues.

**NECROTROPH** - an organism that kills tissues of living hosts by releasing toxins, then lives saprobically on the dead tissues.

**NEMATODES** - threadworms or roundworms; members of Phylum *Nematoda*, pseudocoelomate metazoa, 10,000 spp.; common in soil, decaying organic matter and as parasites of plants and animals. They are preyed upon by some specialized hyphomycetes.

**NEUROTOXIN** - a toxin which affects the nervous system.

**NOBLE ROT** - a condition in which the mould *Botrytis* grows on overripe grapes. A rich, sweet, expensive wine is made in small quantities from such grapes (Sauternes, Trockenbeerenauslese, Botrytis-wine).

**NODOSE** - having one or more rounded projections.

**NOMENCLATURE** - the naming of Fungi is governed by the International Code of Botanical Nomenclature as adopted by each International Botanical Congress; any proposals to change the Code are published, debated, and voted on at such Congresses. If more than one name has been applied to a fungus, the rules help decide which is the proper one. The rules also allow separate binomials for anamorph and holomorph.

**NUCLEOTIDE** - a single unit of nucleic acid, composed of a phosphate, a five-carbon sugar (either ribose or deoxyribose), and a purine or a pyrimidine.

**NUCLEUS** - a specialized body within the eukaryotic cell bounded by a double membrane and containing the chromosomes.

**OCHRATOXINS** - toxins of *Aspergillus ochraceus*, *Penicillium viridicatum*, etc.; causes kidney damage in sheep, cattle and pigs.

**OESTROGENIC SYNDROME** - a condition in which the mycotoxin, zearalenone, a steroid, causes severe sexual dysfunction in pigs (vaginal prolapse, shrivelled testes).

**ONTJOM** - an Indonesian fermented food, prepared from peanut press cake, which has been surface inoculated with the *Monilia* anamorph of *Neurospora sitophila* (*Sordariales*: Ascomycetes).

**ONTOGENY** - development.

**OPPORTUNISTIC** - (relating to pathogens) fungi which are normally saprobic, but occasionally act as





pathogens when condition unusually favourable for infection arise (cf. FACULTATIVE, OBLIGATE).

**ORDER** - taxonomic rank above Family, but below Class; formal suffix is **-ales**.

**ORGANELLES** - specialized sub-cellular structures which perform specific functions in eukaryotic cells, e.g., mitochondria, nucleoli, ribosomes: these are now believed to have been prokaryotic organisms which entered a symbiotic union with the ancestral eukaryotic cells.

**ORGANOLEPTIC QUALITIES** - attributes affecting the senses (taste, smell).

**OSMOTOLERANT** - capable of growing under conditions of high osmotic pressure, as some yeasts and moulds on concentrated sugar solutions.

**OSMOTROPHIC** - acquiring food by absorption, as fungi do.

**OSTIOLE** - the opening at the top of many fungal fruit bodies (perithecia, pycnidia, puffball basidiomata) through which spores escape or are expelled.

**PALISADE** - a layer of cells growing packed close together and parallel to one another.

**PARASEXUALITY** - genetic recombination during the mitotic cycle, best known in conidial fungi (ascomycetous anamorphs, such as *Aspergillus*).

**PARASITIC** - deriving nourishment from another living organism (the host) (cf. NECROTROPHIC, SAPROBIC).

**PATHOGEN** - an organism that causes disease.

**PATULIN** - a mycotoxin from *Aspergillus clavatus*, *Penicillium patulum*, *P. expansum*; antibacterial and antifungal; toxic to plants and animals (carcinogenic to mice) and the cause of neurotoxicosis in cattle.

**PCR** - polymerase chain reaction, a way of replicating a small amount of DNA over and over again until a usable amount has been produced.

**PENDULOUS** - hanging down loosely.

**PENICILLATE** - having conidiophores resembling those of *Penicillium*, with one or more levels of closely packed branches at the apex.

**PENICILLIN** - an antibacterial antibiotic produced by *Penicillium* spp. (Hyphomycetes).

**PENTREM A** - a mycotoxin produced by various *Penicillium* spp., incl. *P. cyclopium*, which affects the nervous system, causing tremors; see NEUROTOXIN, TREMORGEN.

**PERCURRENT** - growing on through the scar left by release of a previous terminal spore; see ANNELLIDIC.

**PERITHECIAL ASCOMA** - walled ascoma usually having an ostiole through which spores can be expelled at maturity; the asci are arranged in an hymenium; characteristic of many ascomycetes with unitunicate-inoperculate asci. May have associated anamorphs.

**PERITHECIUM** - see PERITHECIAL ASCOMA.

**pH** (potential Hydrogen) - a symbol for hydrogen ion concentration in a solution; pH values run from 0 to 14 on a logarithmic scale, the lower the value, the greater the concentration of hydrogen ions, and the more acidic a solution is; pH 7 is 'neutral', pH less than 7 is acidic, pH greater than 7 is alkaline or basic.

**PHENOTYPE** - the physical expression of the genotype.

**PHIALIDE** - a conidiogenous cell which produces a basipetal succession of blastic conidia from an open end without any change in the length of the cell.

**PHIALIDIC** - describes conidia produced by a phialide.

**PHRAGMOBASIDIOMYCETES** - Basidiomycetes in which the basidia are subdivided by primary septa (Orders: *Tremellales*, *Auriculariales*) (cf. HOLOBASIDIOMYCETES, TELIOMYCETES).

**PHRAGMOSPORE** - a spore which has two or more transverse septa; septa appearing like the rungs of a ladder.

**PHYLOGENETIC** - classification of organisms designed to reflect the sequence in which they evolved, and their genetic relationships.

**PHYLOGENY** - evolutionary relationships among organisms; developmental history of a group of organisms through geologic time.

**PHYLUM** (pl. = PHYLA) - a taxon above Class, but below Kingdom. There are five Phyla of fungi: *Dikaryomycota*, *Zygomycota* and *Chytridiomycota* (Eumycotan), *Oomycota* and *Hyphochytriomycota* (Chromistan).

**POLYBLASTIC** - conidiogenous cells with more than one conidiogenous locus.

**POLYMER** - a compound made by linking many identical smaller molecules (monomers), e.g., chitin, a polymer of n-acetyl glucosamine.

**POLYPHALIDE** - a phialide that develops a succession of conidiogenous loci successively higher on the sympodially extending conidiogenous cell.

**POLYSACCHARIDE** - a polymer made up of many linked monosaccharides, e.g., cellulose, a polymer of glucose.

**POLYTRETIC** - having more than one tretic conidiogenous locus on each conidiogenous cell.

**POWDERY MILDEWS** - plant diseases caused by obligately parasitic fungi (*Erysiphales: Ascomycetes*). During much of the growing season, these diseases are essentially caused by the *Oidium*-like anamorphs.

**PREDACEOUS FUNGI** - specialized fungi of several phyla which trap or infect nematodes, rotifers, collembola, amoebae, tardigrades, etc., exploiting them either as principal diet or as a nitrogen supplement.

**PREDACEOUS** - preying upon other organisms, as in the nematode-exploiting fungi.

**PR TOXIN** - a toxin produced by *Penicillium roquefortii* fortunately not during the ripening of blue cheeses.

**PSYCHROTOLERANT** - growing at temperatures below 10C (optimum temp. below 20C).

**PYCNIDIAL CONIDIOMA** - a flask-shaped sporoma produced by coelomycetous anamorphs.

**RACHIS** - a narrow, apical sporogenous extension of a conidiogenous cell, usually sympodial, and producing conidia with minimal (very narrow) connections.

**RAMOCONIDIA** - conidia in genera like *Cladosporium* which mark the branching of an acropetal chain, having one scar at the base, and two or more at the apex.

**RECOMBINANT DNA** - DNA of two different species spliced together in the laboratory.

**REDUCTION DIVISION** - see MEIOSIS.

**SEXUAL REPRODUCTION** - the fusion of gametes followed by meiosis and recombination at some point in the life cycle. This role is carried out by teleomorphs in fungi.

**SOMATIC** - pertaining to the vegetative or assimilative body of an organism.

**SORUS** - a simple fruiting structure produced by some fungi; an aggregation of spore-bearing cells bursting through the host epidermis.

**sp.**- abbreviation for one species.

**spp.** - abbreviation for more than one species.

**SPECIES** - the lowest-ranking taxon normally used (though subspecies, variety and race are subspecific taxa); comprises individuals very similar in all major respects; often used for organisms that are normally capable of interbreeding; among anamorphic fungi has a mainly morphological/developmental connotation. The name of a species is called a binomial or binominal, and has two parts, a generic name which is capitalized, followed by a species epithet. Both words are italicized.

**SPORE** - specialized microscopic propagule, usually an agent of dispersal, in fungi, cryptogamic plants, many protozoa, chromista and bacteria: capable of developing into an adult without fusion with another cell. In fungi may be unicellular or composed of two to many cells.

**SPORIDESMIN** - hepatotoxic mycotoxin formed by *Pithomyces*, causes facial eczema in sheep.

**SPORODOCHIAL CONIDIOMA (SPORODOCHIUM)** - a cushion-like sporoma produced by some hyphomycetous anamorphs.

**SPOROMA** (pl. = SPOROMATA) - any multicellular structure specially developed to produce spores.

**SPOROTRICHOSIS** - a lymphatic mycosis caused by *Sporothrix schenckii* (Hyphomycetes).

**SPORULATION** - the production of spores.

**STACHYBOTRYOTOXIN** - a mycotoxin produced by the hyphomycete, *Stachybotrys*, growing on hay; implicated in serious poisoning of horses.

**STAUROSPORES** - spores with three to many radiating extensions.

**STERIGMA** (pl. = STERIGMATA) - a short apical outgrowth of a basidium, with a minute, pointed extremity on which a basidiospore is produced and from which it is forcibly discharged. (N.B.: sometimes incorrectly applied to small phialides and other peg-like structures on which spores are borne).

**STERILIZATION** - the process whereby all microorganisms and their propagules are killed by exposure to heat (see AUTOCLAVING), radiation, or chemicals, or removed by filtration.

**STIPE** - a stalk which lacks true vascular tissue, as in mushrooms.

**STIPITATE** - stalked.

**STROMA** (pl. = STROMATA) - mass of fungal tissue within which or from which perithecial or other fructifications are formed (cf. SCLEROTIUM, BULBIL).

**SUBPHYLUM** - taxon above Class but below Phylum; suffix is **-mycotina**.

**SUBSTRATE** - (1) the food of a fungus; (2) substance acted on by an enzyme; (3) the material from which a fungus is fruiting - e.g. many moulds occur on wood, paper, dead leaves, etc.

**SYMBIOSIS** - a state of intimate association or living together; the relationship benefits both partners in MUTUALISTIC symbioses, or one partner at the expense of the other in PARASITISM, or may be neutral, as in COMMENSALISM.

**SYMPODIAL** - describes blastic conidia formed on a conidiogenous cell by the growth of a succession of apices, each originating below and to one side of the last. The conidiogenous cell usually becomes longer, but in some cases becomes inflated, as a result of repeated spore formation.

**SYNANAMORPH** - one of two or more different anamorphs which develop simultaneously, or are otherwise known to be associated with a single teleomorph.

**SYNCHRONOUS** - describes blastic conidia initiated simultaneously in a cluster or on a specialized cell.

**SYNNEMATAL CONIDIOMA (SYNNEMA)** - the sporoma of some hyphomycetes, in which many conidiophores are aggregated into a column.

**TAXA** (sing. = TAXON) - groupings of organisms made for systematic purposes: range in rank from species to Kingdom.

**TAXONOMY** - the classification of organisms on the basis of their evolutionary relationship; see CLASSIFICATION.

**TELEOMORPH** - the sexual manifestation of a fungus; unknown in many taxa (cf. ANAMORPH, HOLOMORPH).

**TERATOGENIC** - causing abnormalities of growth of a fetus.

**TETRARADIATE** - describes the staurospores of some stream-inhabiting fungi; the four (sometimes more) arms ensure a stable three-point landing on the substrate.

**THALLIC** - one of two basic modes of conidium development; if there is any enlargement of the conidium initial, it occurs only after the initial has been cut off by a septum; derived from conversion of pre-existing hyphal elements (cf. BLASTIC).

**THERMOLABILE** - tending to break down when heated.

**THERMOTOLERANT** - capable of growing at high temperatures (up to 60C, opt. 40-50C) (cf. PSYCHROTOLERANT).

**THRUSH** - a yeast infection of the mouth and throat, esp. in children, caused by *Candida albicans*.

**TINEA** - a superficial infection caused by dermatophytes (q.v.).

**TISSUE** - a group of similar cells organized into a structural and functional unit.

**TOXIGENIC** - producing toxins.

**TRANSLOCATION** - movement of nutrients or other substances within an organism.

**TREMORGEN** - a mycotoxin inducing a neurotoxicosis (tremor) in man and other mammals; a





**NEUROTOXIN.**

**TRETIC** - describes conidia which arise through narrow pores which are surrounded by a thickened and often pigmented rim.

**TRICHODERMOID** - describes conidiophores in which branches and conidiogenous cells arise repeatedly at right angles (perpendicular) to the various axes, as in *Trichoderma*.

**TRICHOHECENES** - mycotoxins (scirpenes) of *Fusarium tricinctum*, *F. sporotrichioides*, *F. poae*, and *Trichothecium* (Hyphomycetes).

**T-2 TOXIN** - a mycotoxin of the trichothecene group, produced by several *Fusarium* spp.; the cause of alimentary toxic aleukia.

**VECTOR** - an organism which consciously or unconsciously aids in the dispersal of another, e.g., dipteran flies are vectors for stinkhorns.

**VEGETABLE CATERPILLAR** - a mummified lepidopteran larva from which arises the stromatic teleomorph of a species of *Cordyceps* (*Clavicipitales*: Ascomycetes).

**VERTICIL** - several cells or branches arising at the same level in a radial arrangement, as in *Verticillium*.

**VERTICILLATE** - producing branches in verticils.

**VOMITOXIN** - 4-Deoxynivalenol, a trichothecene; a mycotoxin produced by *Fusarium graminearum* (Hyphomycetes); esp. in barley and winter wheat; has an emetic effect livestock.

**WATER ACTIVITY ( $a_w$ )** - expresses the available water in a substrate as a decimal fraction of the amount present when the substrate is in equilibrium with a saturated atmosphere (an equilibrium relative humidity of 70% around the substrate means that the substrate has a water activity of 0.70).

**WATER MOULDS** - members of the Order *Saprolegniales* (*Oomycetes* - not true fungi).

**WHORL** - see verticil.

**WILT** - a plant disease, caused by species of *Verticillium* and *Fusarium* (Hyphomycetes), characterized by loss of turgidity and collapse of leaves.

**XEROTOLERANT** - able to grow under dry conditions.

**YEASTS** - fungi which in many cases are unicellular, though some produce hyphae; most yeasts are anamorphs; their cells are conidia, and they multiply by various kinds of conidiogenesis. Some can produce asci, some can form basidia, and some appear to be anamorphic holomorphs -- entirely asexual.

**ZEARALENONE** - a mycotoxin produced by *Fusarium graminearum* (teleomorph in *Gibberella zeae*); the cause of oestrogenic syndrome (vulvovaginitis and infertility) in pigs.