10) Ecologia. Sapróbios, simbiontes mutualistas (plantas e animais)

Micorriza arbuscular - Arbúsculo (fornece fósforo à raíz da planta)

Jardim fúngico subterrâneo mantido por *Acromyrmex*

10) Ecologia. Simbiontes mutualistas

Formiga "Corta-folhas"

(América Central e América do Sul)

Cultivam fungos celulolíticos em **jardins subterrâneos**, em cultura pura, fornecem – lhes o alimento (folhas), húmidade e inibem o crescimento de outros microrganismos (saliva e fluido anal)

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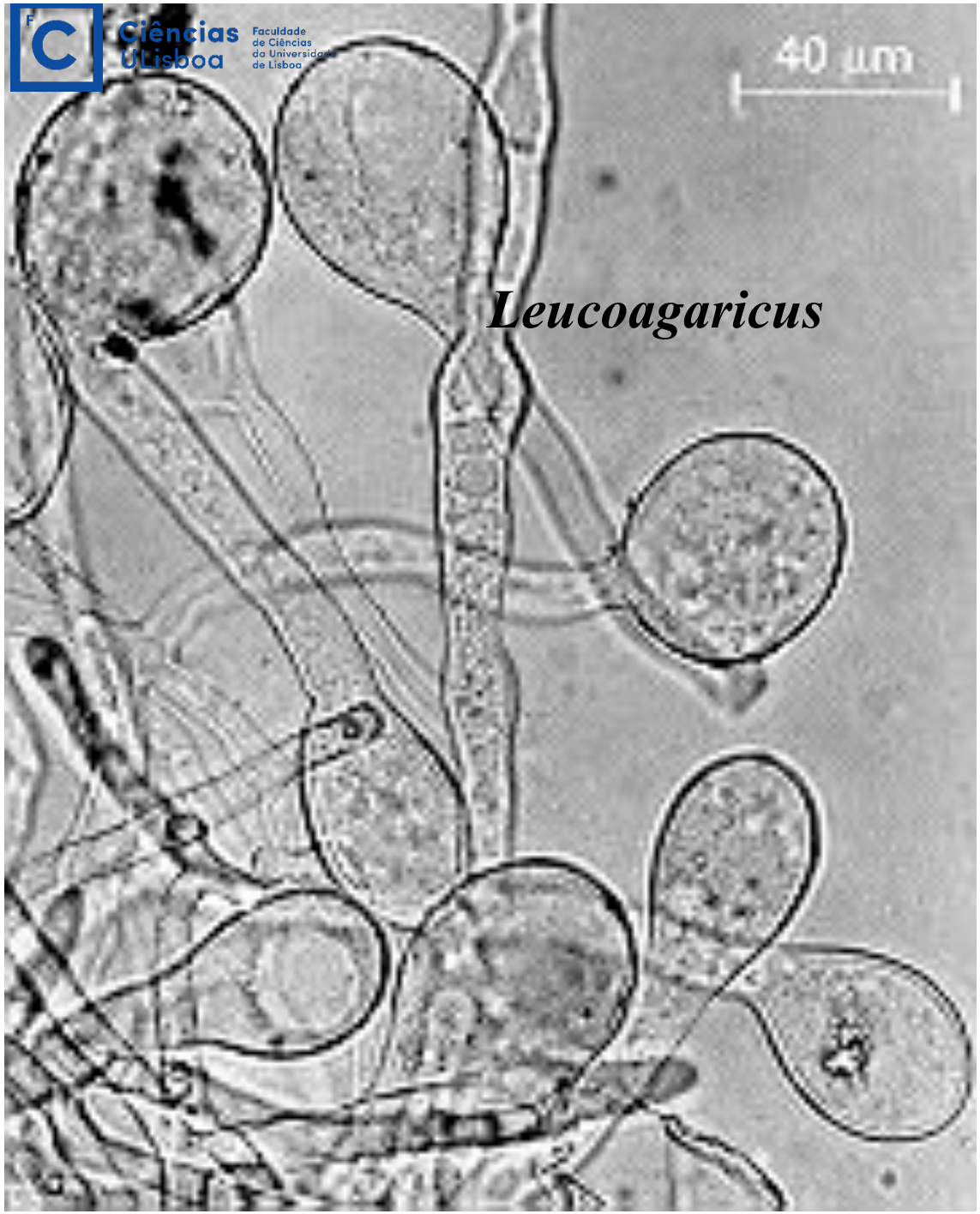
Jardim mantido por *Acromyrmex*

3 Jardins de *Atta cephalotes* Kendrick, 2000



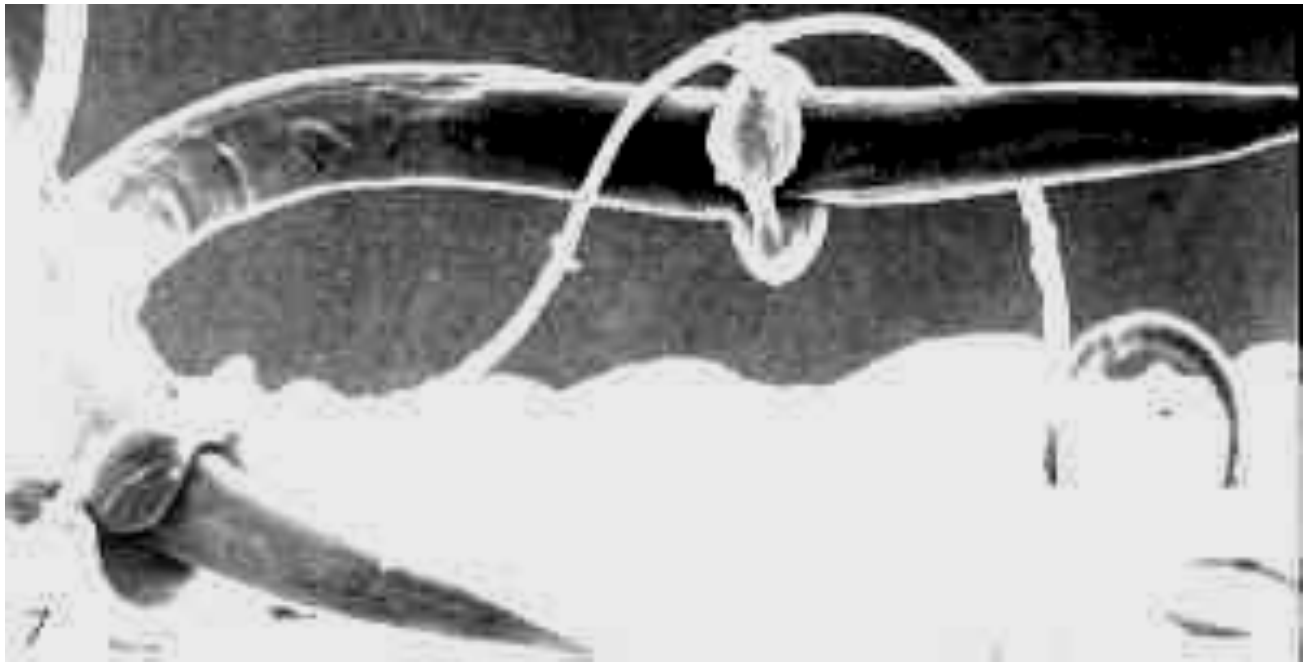
Fungo diferencia cachos de hifas com as extremidades dilatadas que servem de alimento as formigas

Outros géneros cultivados pelas formigas:

Lepiota, *Auricularia (basidiomycetes)*, *Xylaria* (*ascomycete*)

Kendrick, 2000

***Termitomyces reticulatus* (Lyophyllaceae) fruiting from underground fungus gardens of the termite *Odontotermes badius*. © Duur Aanen.**



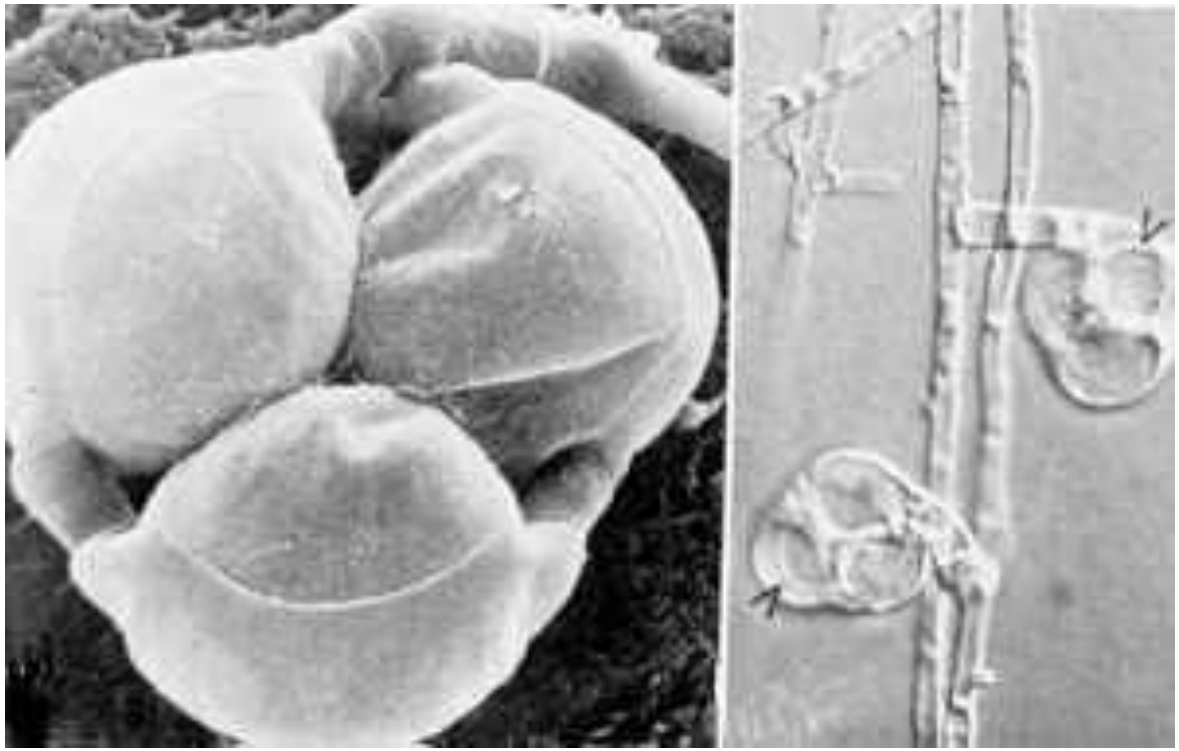
Armadilha -

Anel contráctil

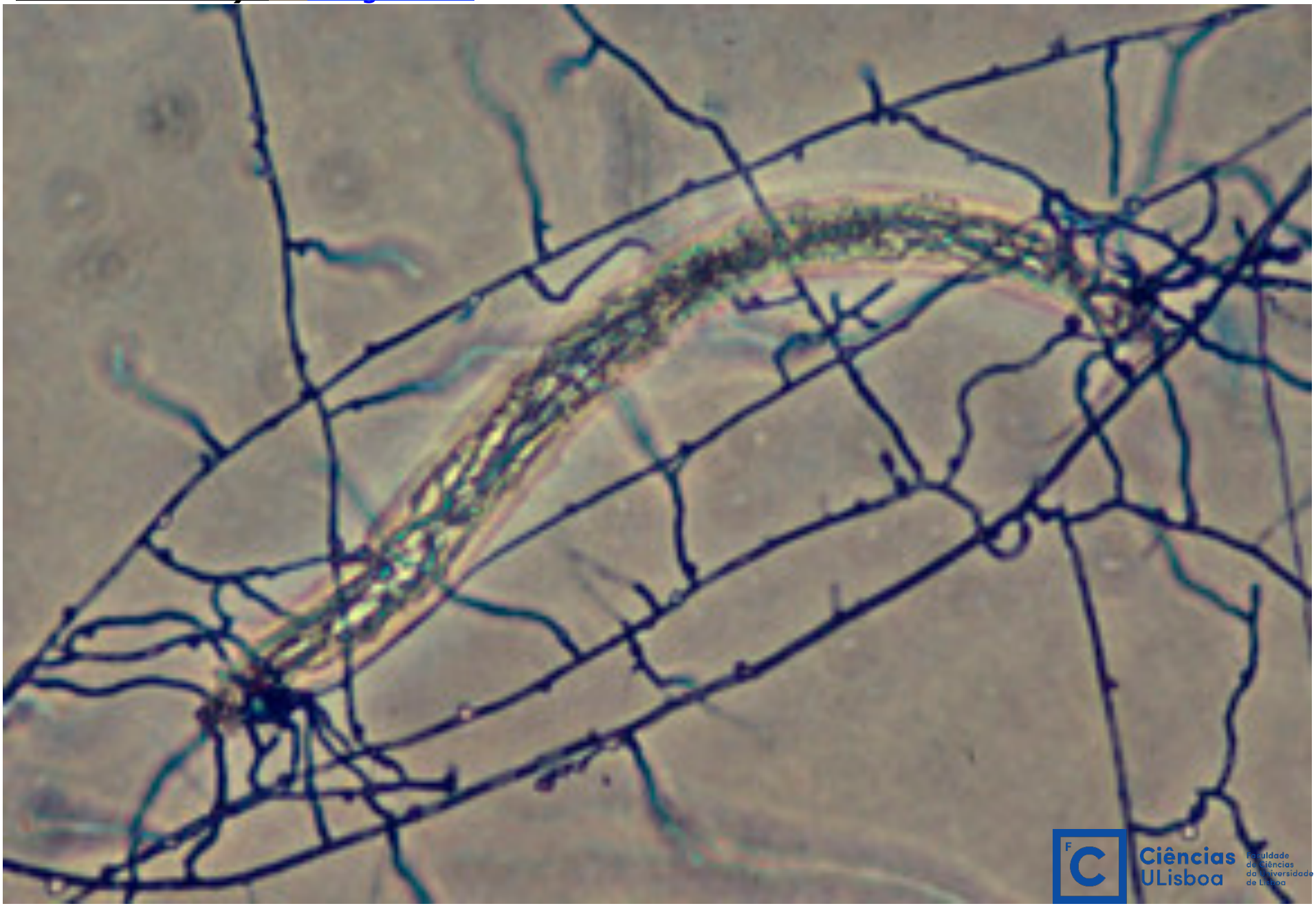
(3 células com origem num estipe)

Arthrobotrys spp.

- fungo mitospórico



Attack and consumption of a nematode by *Pleurotus* (Oyster Mushroom, Pleurotaceae). © Greg Thorn.



Armadilhas

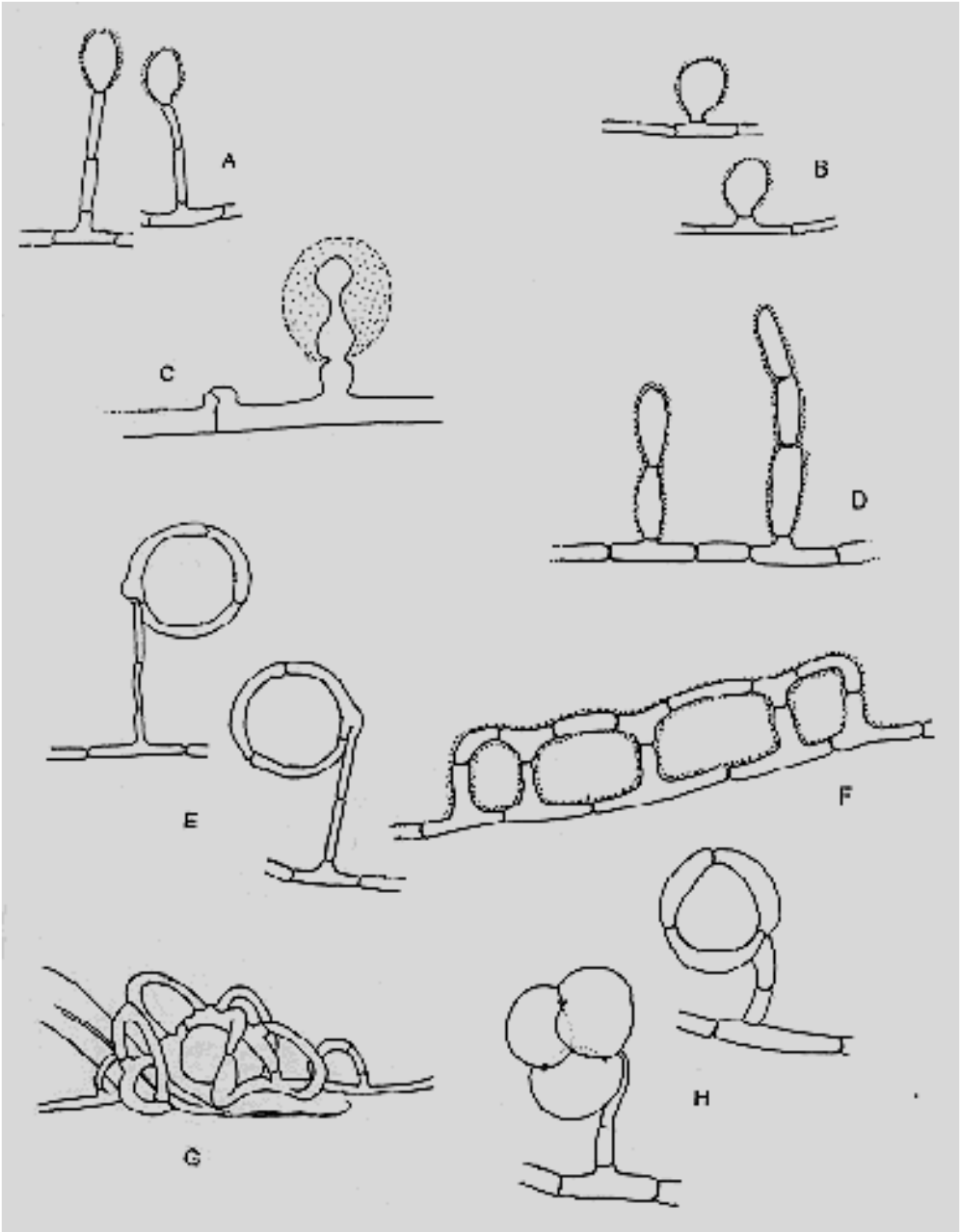
A,B e C – bolas adesivas

D – ramos adesivos

F e G – redes adesivas

E – anéis não contrácteis

H – anéis contrácteis



10) Ecologia. Parasitas de plantas (necrotróficos e biotróficos)

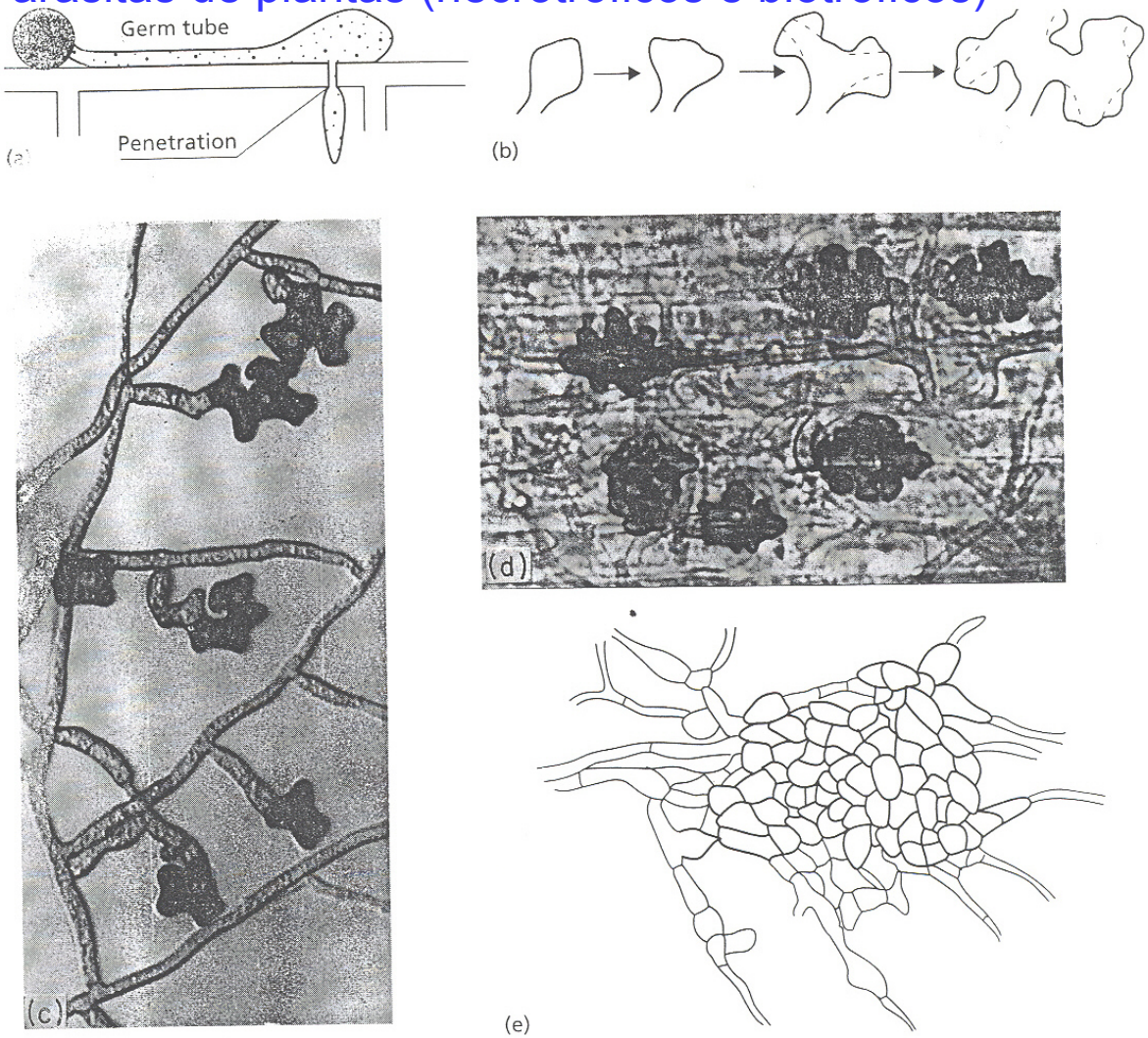


Fig. 4.2 Pre-penetration structures of plant pathogens. (a) Appressorium, produced as a terminal swelling on a germ tube; an equivalent structure formed on a short hyphal branch is termed a hyphopodium. (b)–(d) Lobed, melanized hyphopodia of one of the take-all fungi, *Gaeumannomyces graminis* var. *graminis*; each consists of a single cell. (b) Suggested mode of development of lobed structures by repeated stoppage, swelling and branching of a hyphal tip (see Fig. 3.2). (c) Lobed hyphopodia produced against the base of a Petri dish in agar culture. (d) The same structures formed on the surface of a wheat stem base as a prelude to infection. (e) Infection cushion of the eyespot fungus *Pseudocercosporella herpotrichoides* formed on the base of a Petri dish or on a cereal stem; they consist of plaques of swollen cells produced by repeated apical branching and septation.

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10) Ecologia. Parasitas de plantas (biotróficos)

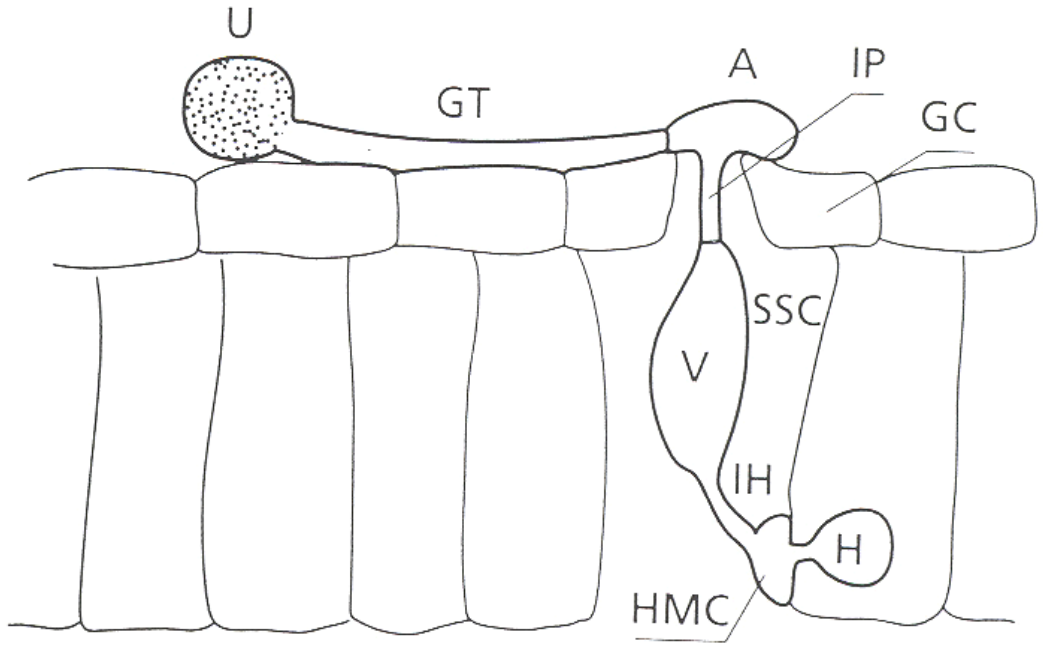

Fig. 4.4 Infection structures of the bean rust fungus, *Uromyces appendiculatus*, penetrating a stomatal opening from a germinating uredospore. U, uredospore; GT, germ tube; A, appressorium; GC, stomatal guard cell; IP, infection peg; V, sub-stomatal vesicle; SSC, sub-stomatal cavity; IH, infection hypha; HMC, haustorial mother cell; H, haustorium. (Based on a drawing by H. C. Hoch & R. C. Staples; see Hoch *et al.*, 1987.)

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Limites inferior e superior e Temperatura óptima (·) para o crescimento de alguns fungos

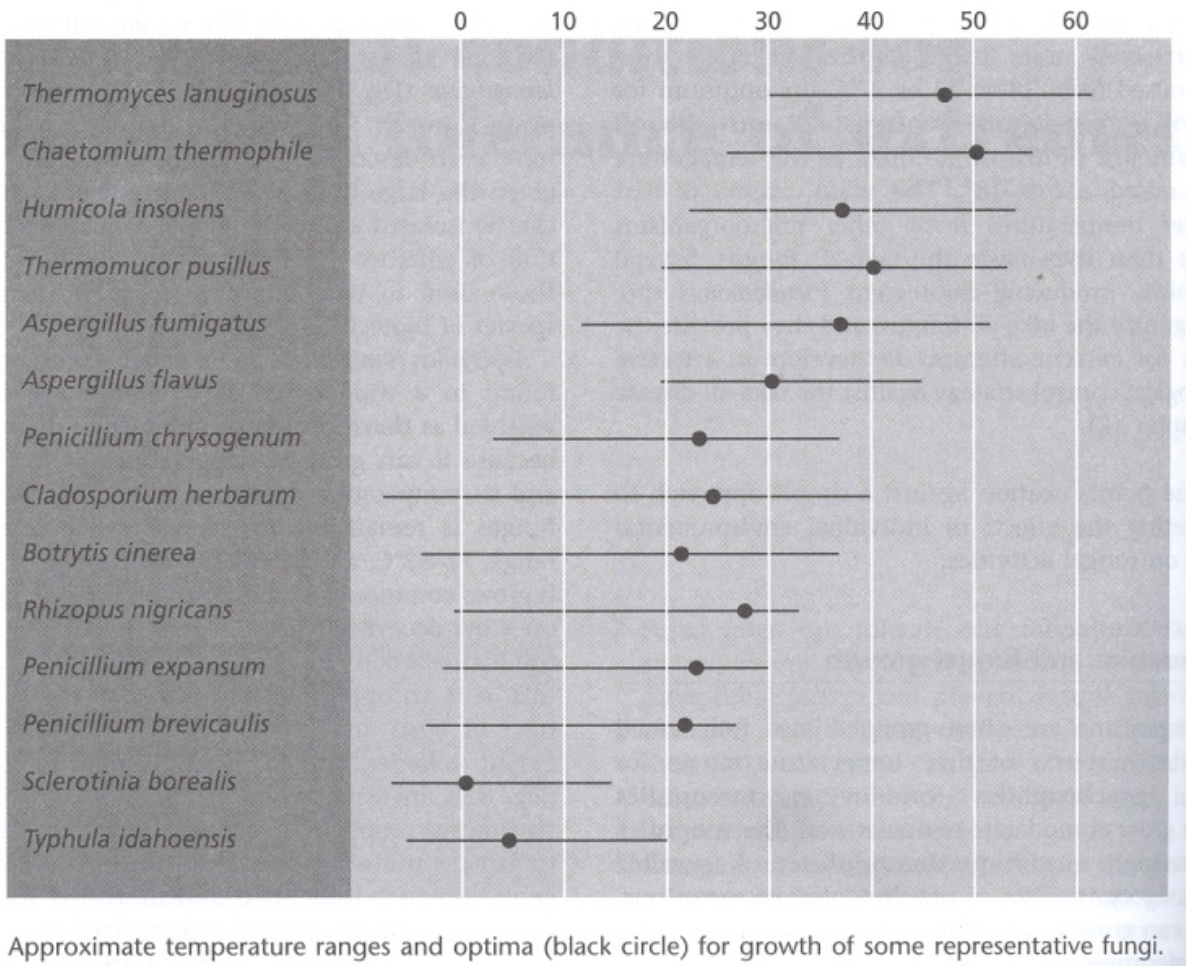

Fig. 8.2 Approximate temperature ranges and optima (black circle) for growth of some representative fungi.

P	abaixo 4ºC	16ºC	20ºC	(poucos fungos)
M	10ºC	20-30ºC	40ºC	(maioria dos fungos)
T	20ºC	40º-50ºC	60ºC	(cerca de100 fungos)

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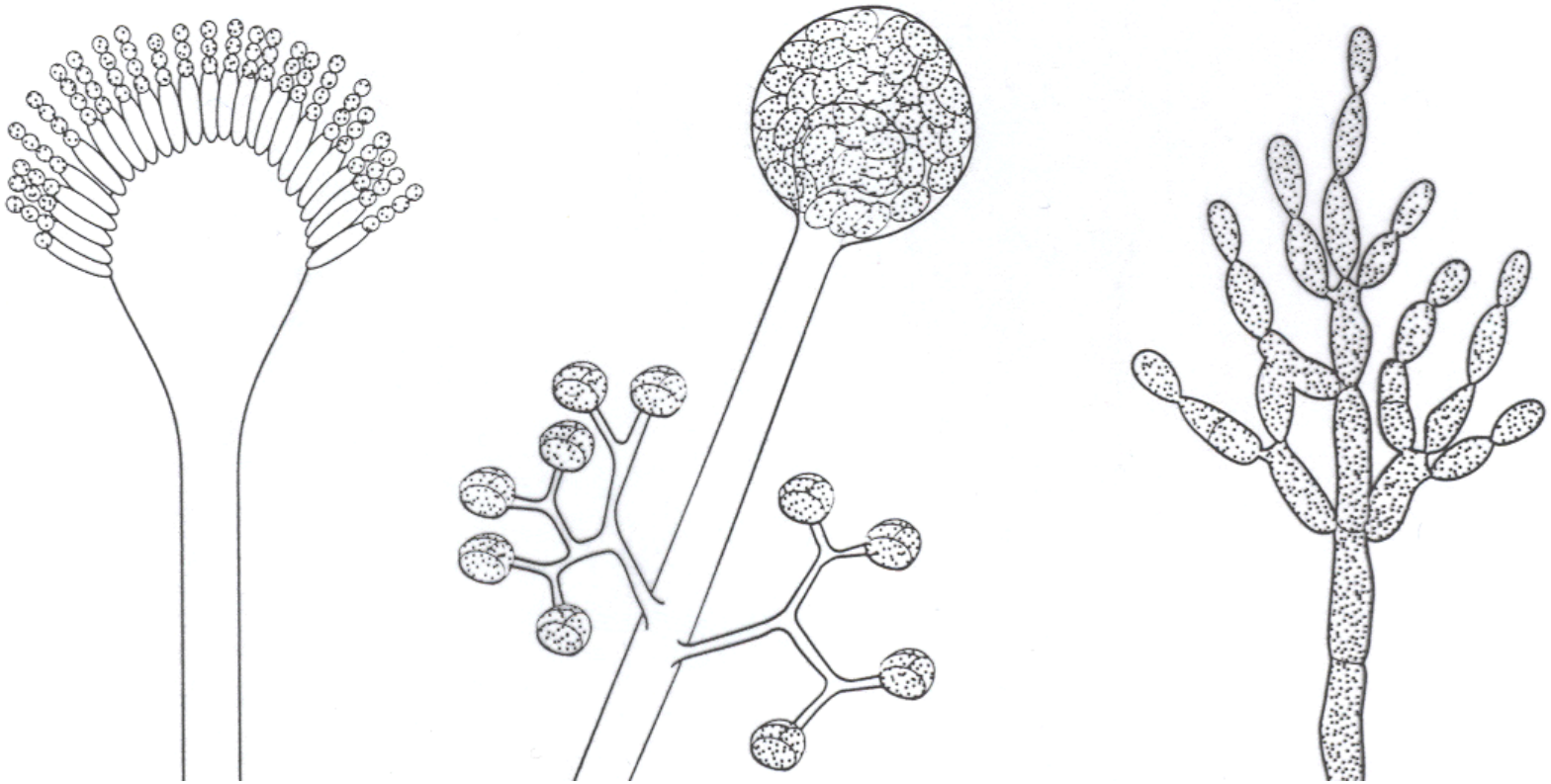

Aspergillus fumigatus *Thamnidium elegans* *Cladosporium herbarum*

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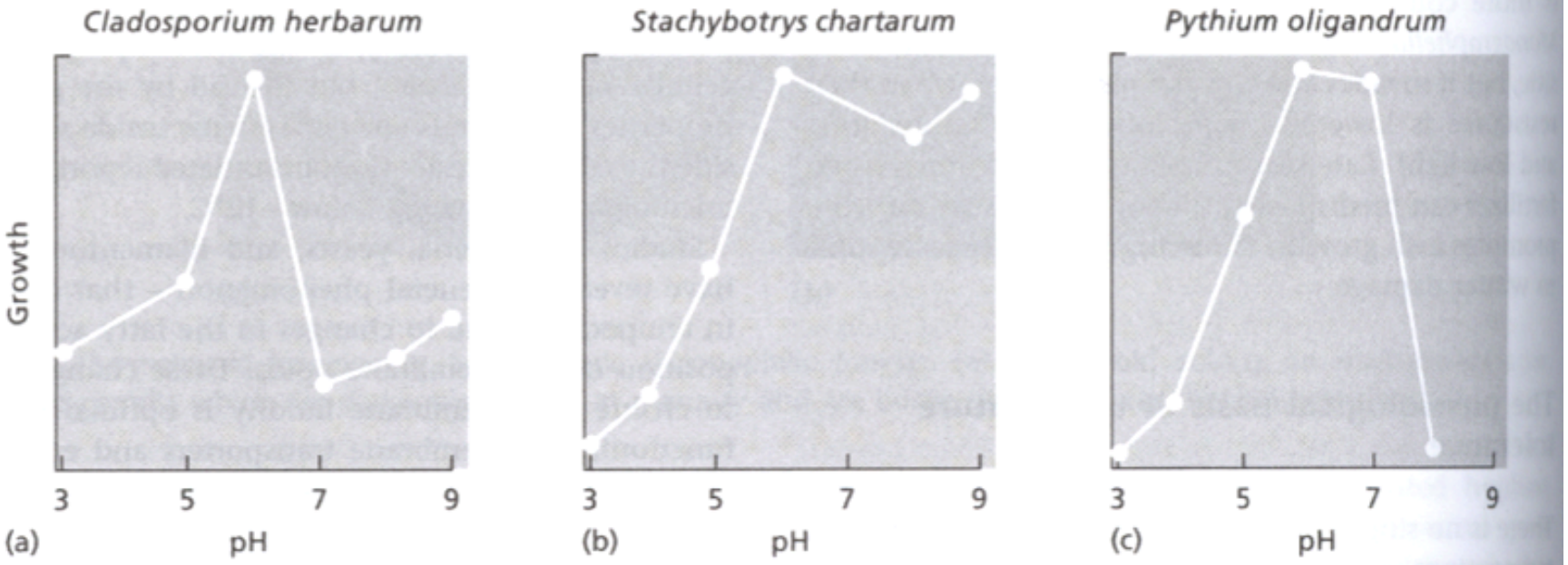

Fig. 8.5 (a–c) pH growth response curves of three representative fungi in laboratory culture (*Pythium oligandrum* is a member of the cellulose-walled Oomycota).

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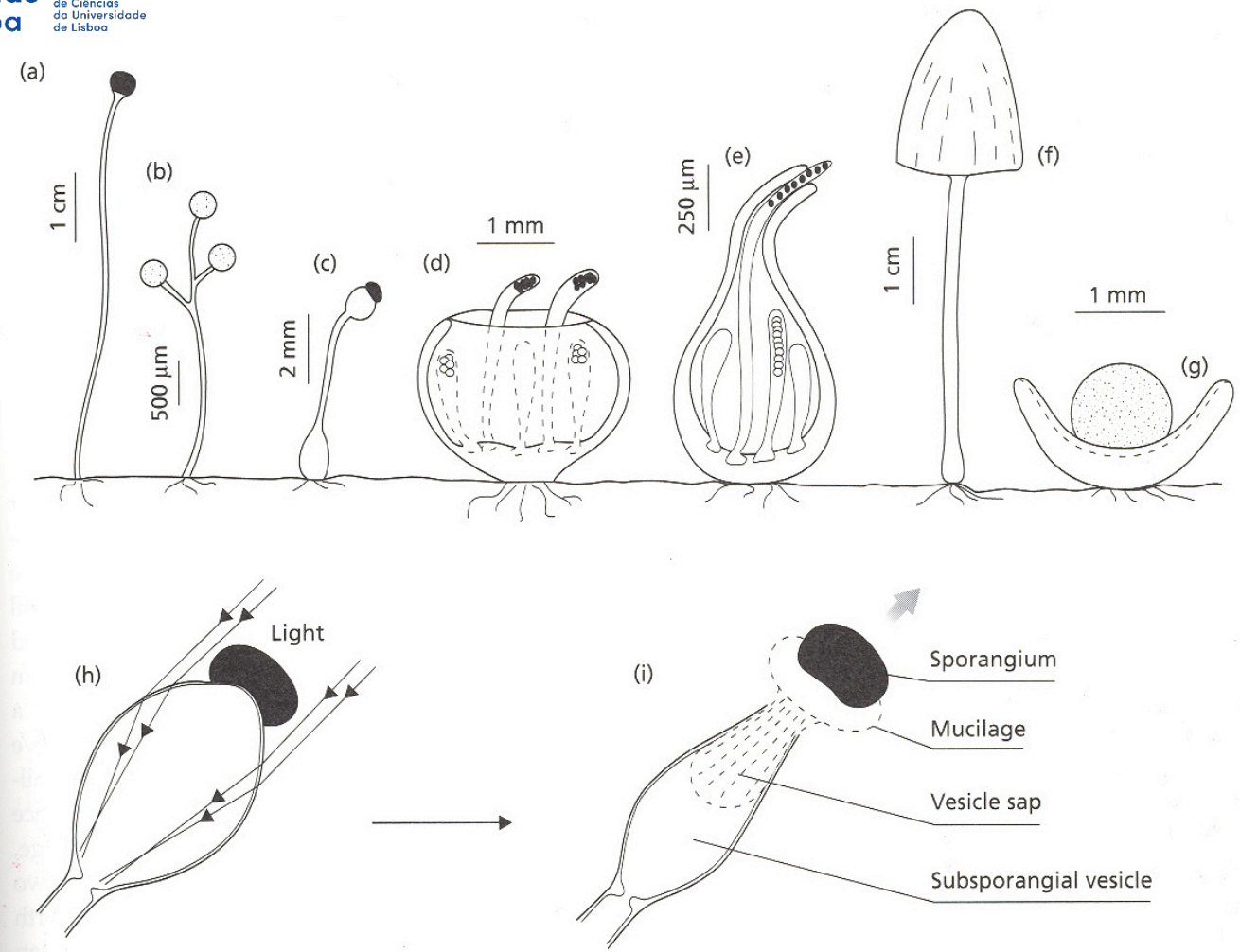

Fig. 9.5 Diagrammatic representation of some coprophilous fungi. (a) *Pilaira anomala* (zygomycota); the sporangiophore elongates to several centimetres at maturity and the spores 'flop' onto the surrounding vegetation. (b) *Mucor racemosus* (zygomycota). (c) *Pilobolus* spp. (zygomycota; see also (h) and (i)). (d) *Ascobolus* spp. (acomycota); the tips of the mature asci project from the apothecium and are phototropic. (e) *Sordaria* spp. (ascomycota); the perithecium neck is phototropic and the mature asci elongate up the neck to discharge the ascospores. (f) *Coprinus* spp. (basidiomycota). (g) *Sphaerobolus* spp. (basidiomycota); the large spore mass is shot from the cup-shaped fruitbody when the layers of this separate and the inner layer suddenly inverts. (h,i) *Pilobolus*, showing how the terminal vesicle of the sporangiophore acts as a lens to focus light and orientate the sporangiophore, and the mechanism of discharge of the sporangium.

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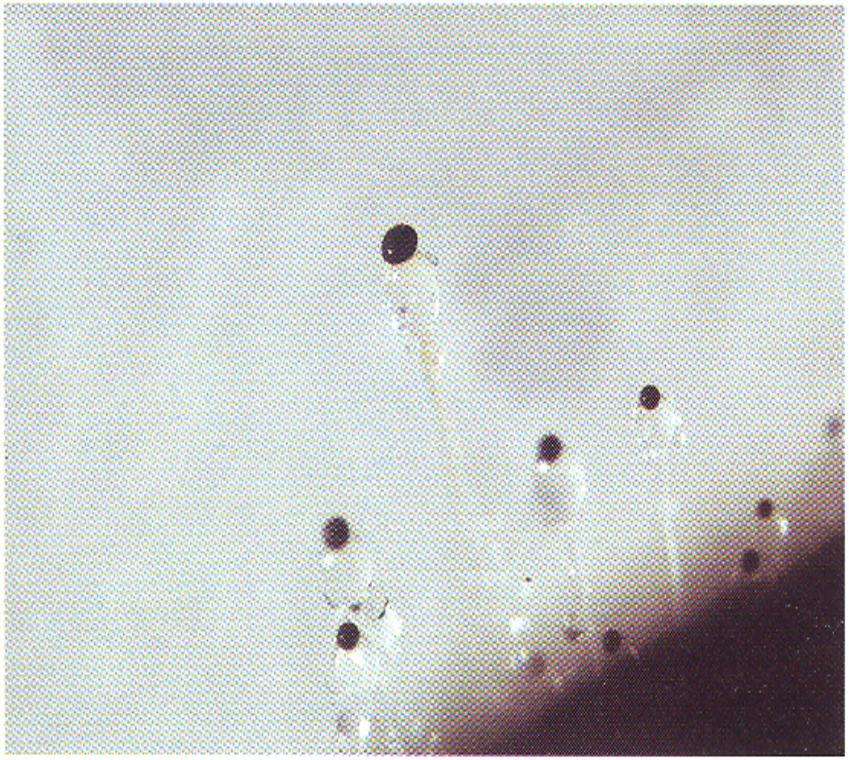
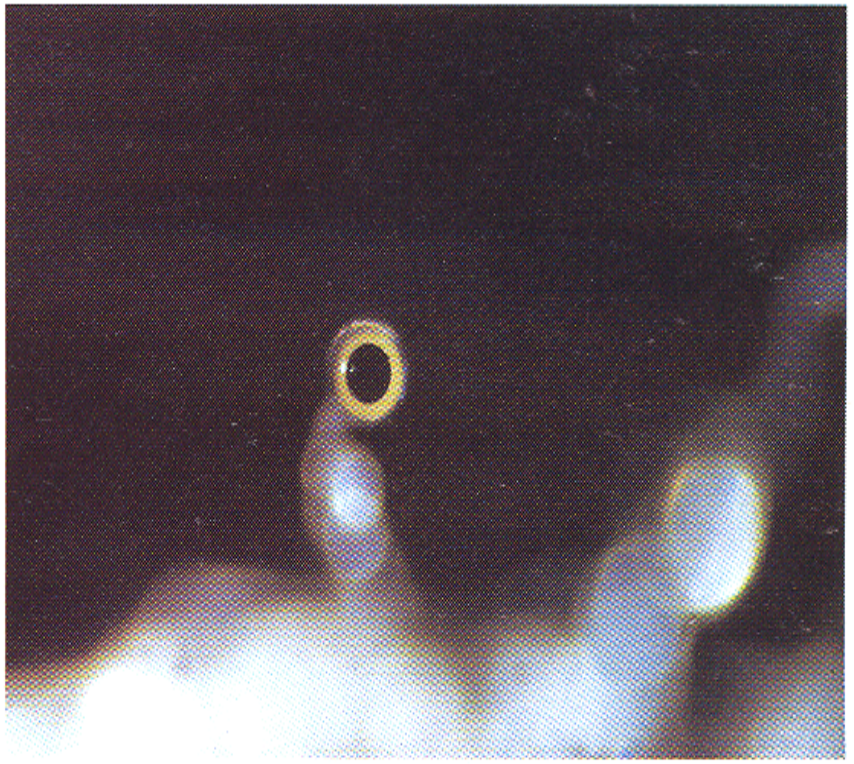
(a)





(b)

Plate 9.2 Sporing structures of *Pilobolus* on horse dung. (a) Sporangiophores, each with a terminal vesicle and a black sporangium; a ring of yellow carotenoid pigment is seen at the base of the vesicle of the longest (mature) sporangiophore. (b) A sporangiophore that has orientated towards a light source and is seen end-on, showing that the vesicle beneath the sporangium acts as a lens and has 'magnified' the yellow pigment, used for phototropism.

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Oxigénio

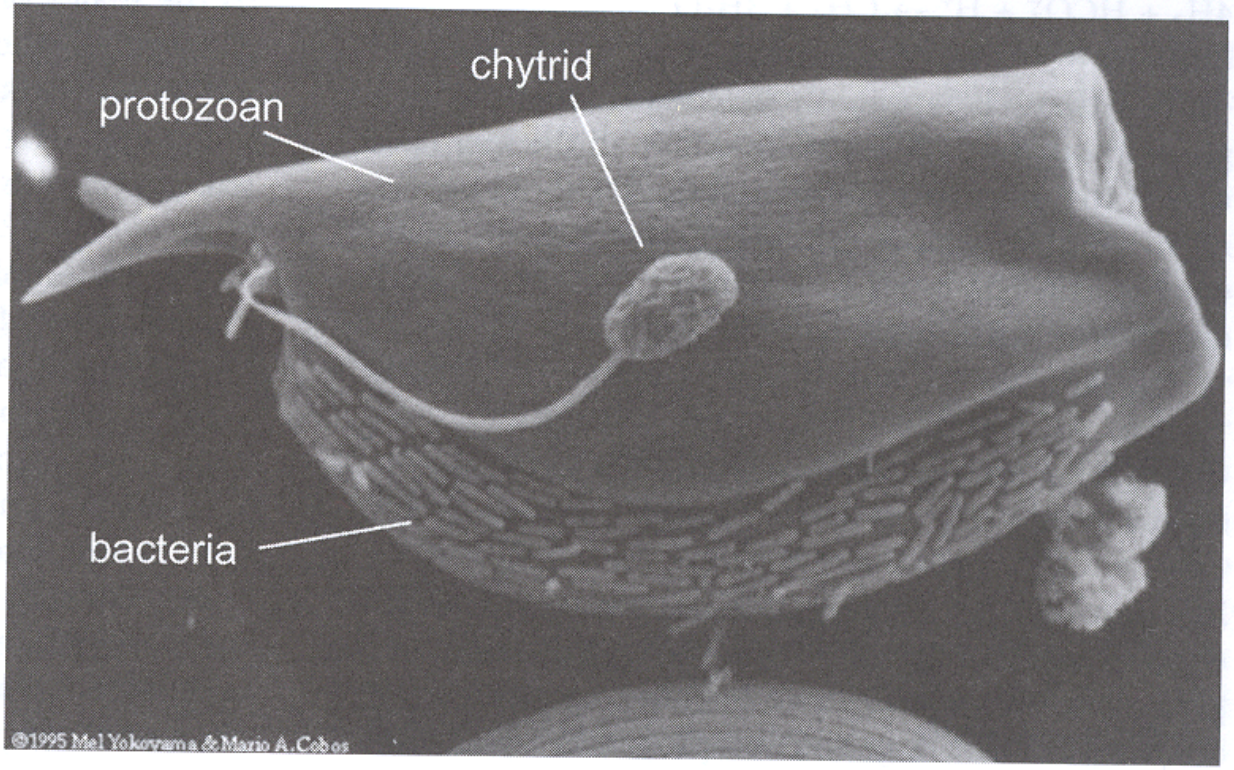
Exemplos de Aeróbios obrigatórios: *Phycomyces e Rhodotorula*

Exemplos de Aeróbios facultativos: *Fusarium oxysporum, Mucor hiemalis, Aspergillus fumigatus e leveduras* (*Saccharomyces*)

Exemplos de Fermentativos obrigatórios: *Aqualinderella fermentans* – *Oomycota e Blastocladiella ramosa – Chytridiomyota*

Oxigénio

Exemplos de Anaeróbios obrigatórios: *Neocallimastix, Caecomyces, Piromyces, Orpinomyces* e *Ruminomyces* – *Neocallimastigomycota* (*Neocallimastigales* - *Chytridiomyota*)



Parte do consórcio do rúmen – Protozoário, zoósporo (*Neocallimastigomycota*) e bactérias

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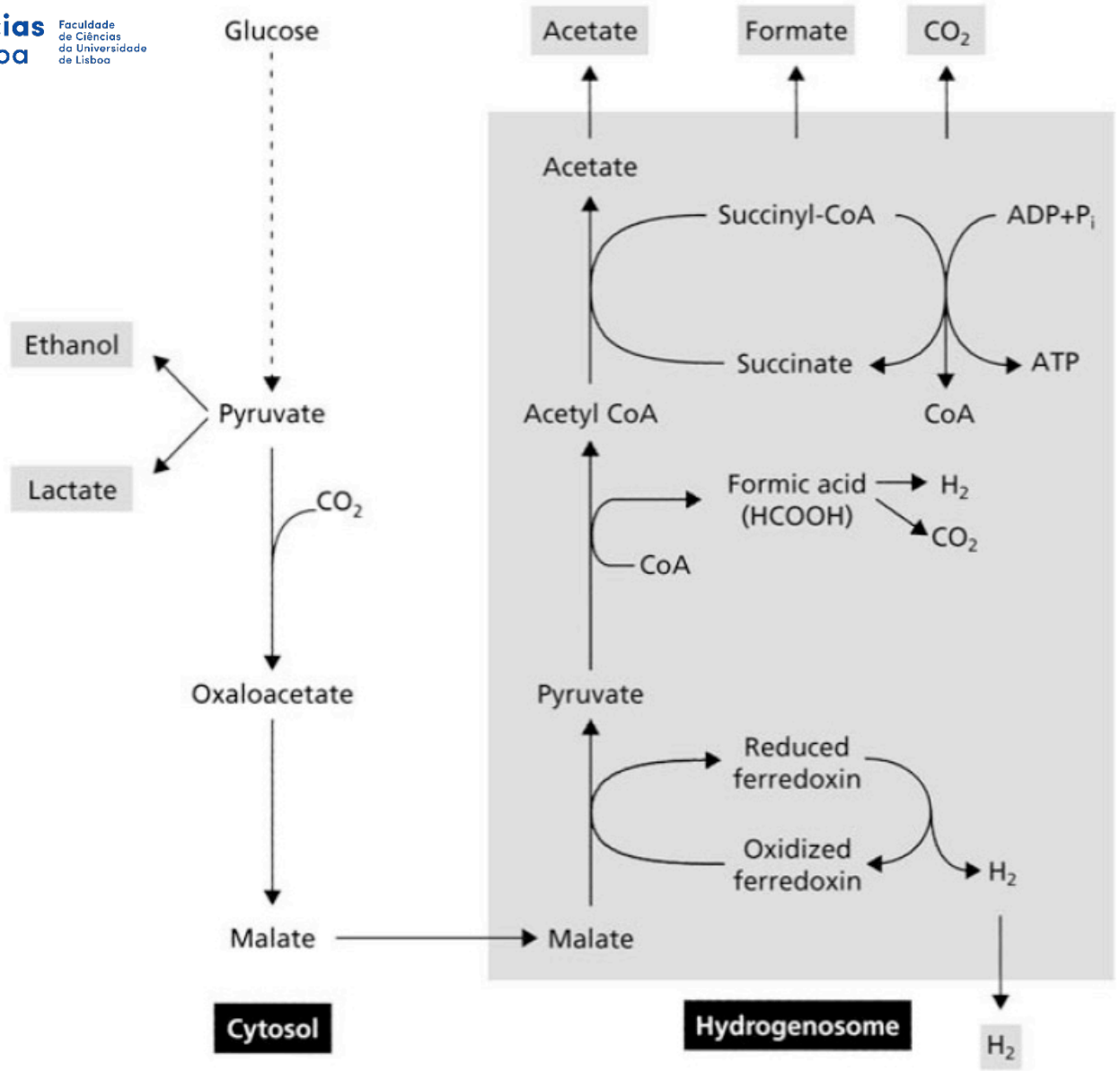

Fig. 8.8 Diagram of the mixed-acid fermentation of the rumen chytrid *Neocallimastix*. The end-products of this fermentation are shown in the small shaded boxes. Part of the fermentation occurs in the cytosol, part in the hydrogenosome. Some of the details are known (Orpin 1993; Marvin-Sikkema *et al.* 1994); others details are assumed, based on knowledge of the mixed-acid fermentation of some enteric bacteria. (After Trinci *et al.* 1994.)

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