

# CANDIDA



Dr. Poonam Shakya

# *CANDIDA ALBICANS*

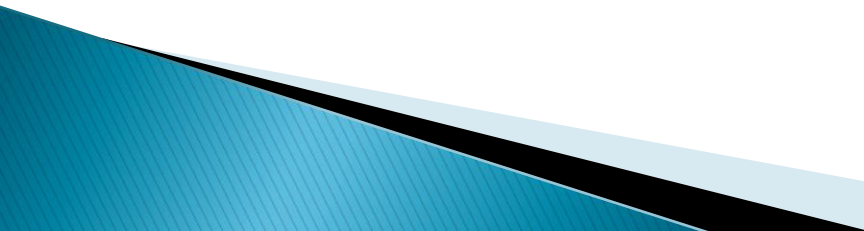
- ▶ *Commonly associated with disease in animals*
- ▶ *Grows as a budding yeast cell*
- ▶ *Oval , 3.5–6.0 × 6.0–10.0 μm in size*
  
- ▶ Pseudohyphae are also produced in animal tissue by elongation of individual yeast cells that fail to separate. These can be mistaken for septate hyphae of moulds
- ▶ Thick-walled resting cells, known as chlamydospores, are produced *in vitro* on certain media such as cornmeal Tween 80 agar
  
- ▶ At both 25°C and 37°C it produces white, shiny, high convex colonies in 24–48 hours

# Natural Habitat

- ▶ Worldwide in distribution
- ▶ *Commensal of mucocutaneous areas*, particularly of the intestinal & genital tracts of many animal species and humans
- ▶ Most infections are endogenous in origin and predisposing causes, such as immunosuppression, prolonged antibiotic therapy, intercurrent infection & malnutrition, can initiate infections
- ▶ In cattle the yeast is often introduced into the udder on the nozzle of tubes of intramammary antibiotics

# Pathogenesis

- ▶ Neuraminidase & proteases may play a part in virulence
- ▶ Cell wall glycoproteins - endotoxin-like activity
- ▶ Candidal surface proteins- adhesion
- ▶ Extracellular, cytotoxic phospholipases & proteases-  
tissue invasion
- ▶ *The yeast form* - responsible for colonization of epithelial surfaces whereas tissue penetration and invasion is mediated by transition to the hyphal form

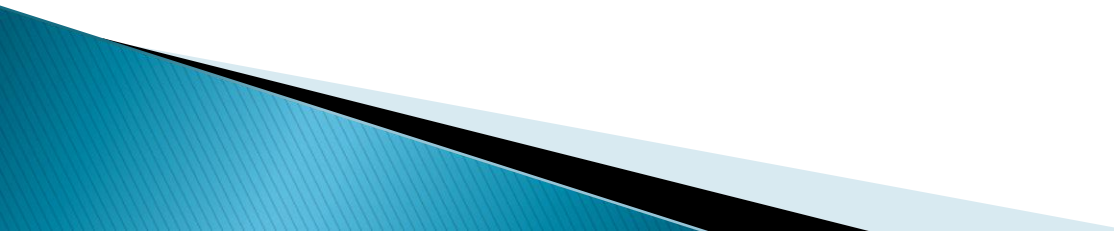
- ▶ In severe, chronic infections, such as infection of the crop in chickens, the wall of the crop becomes thickened and covered by a corrugated pseudomembrane of yellowish-grey necrotic material giving it the characteristic ‘terry-towelling’ effect.
  - ▶ Infections due to *C. albicans* have been given several names including moniliasis, candidosis and candidiasis.
  - ▶ Mastitis in cattle being caused by other *Candida* species including *C. tropicalis*, *C. pseudotropicalis*, etc.
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**Table 40.1 Diseases and main hosts of *Candida albicans***

<b>Hosts</b>	<b>Diseases</b>
Birds	Crop mycosis ('thrush') may affect the crop, mouth or oesophagus causing stunting and high mortality in young birds
Horses	Gastric ulceration in foals. Genital infections have been described in adults
Cattle	Pneumonic, enteric (gastro-oesophageal ulcers, rumenitis) and generalized candidiasis. Infection seen in calves following prolonged antibiotic therapy. A mild and self-limiting mastitis may occur in cows. Abortion has also been reported
Pigs	Gastro-oesophageal ulcers
Dogs	Mycotic stomatitis occurs in pups. Genital tract infections in bitches. Cutaneous candidiasis has been described. Generalized infections occur rarely
Cats	Mycotic stomatitis in kittens. Pyothorax, rare cases due to <i>C. albicans</i>

# Laboratory Diagnosis

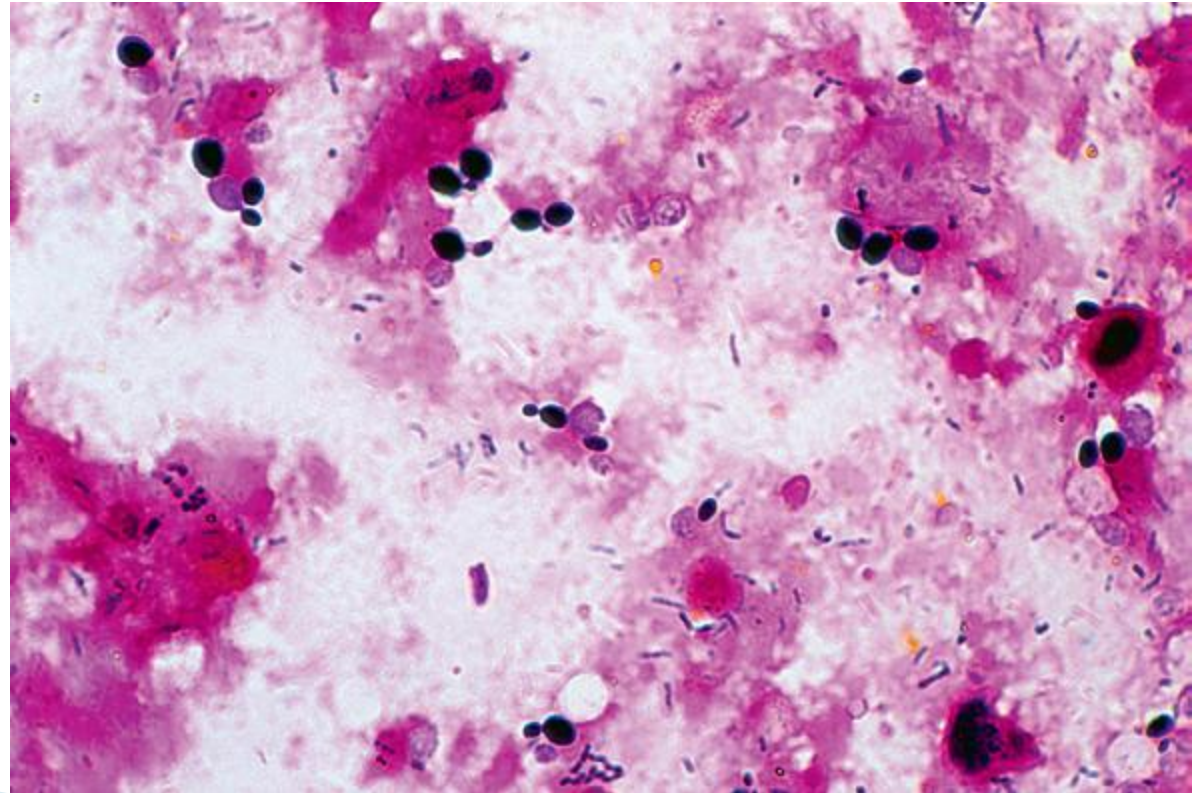
## Specimens

- ▶ Scrapings from lesions
  - ▶ Centrifuged milk samples
  - ▶ Biopsy or tissue samples in 10% formalin for histopathology
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# Direct microscopy

- ▶ Gram-staining
- ▶ *Candida albicans* stains purple-blue with the Gram-stain





- ▶ 10% KOH preparations
- ▶ PAS-haematoxylin or methenamine silver stains
- ▶ In tissue sections it appears as thinwalled, oval, budding yeast cells, hyphae and/or pseudohyphae

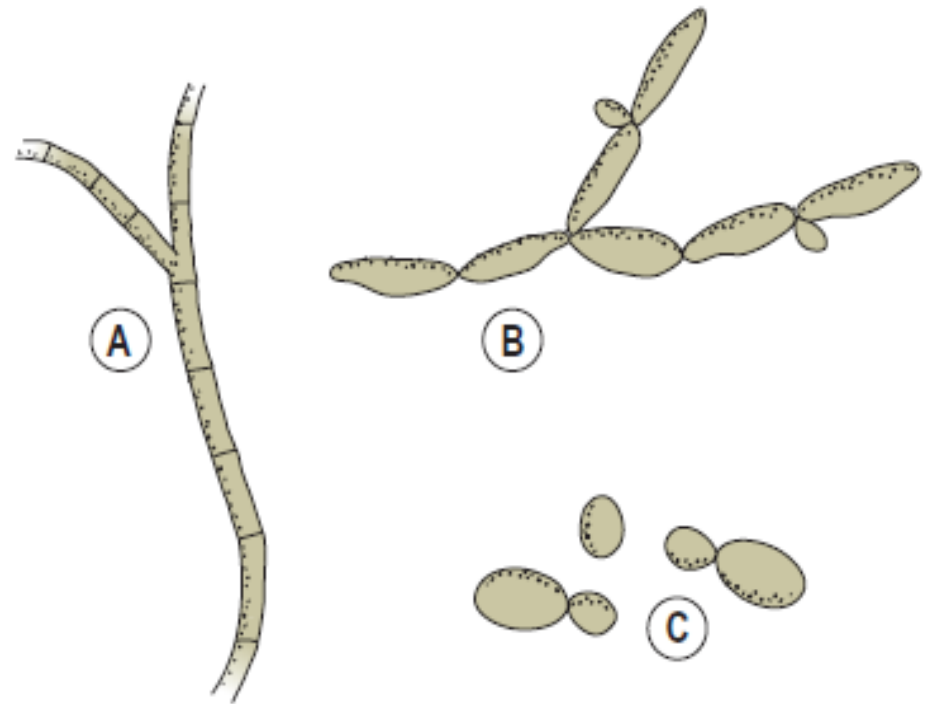
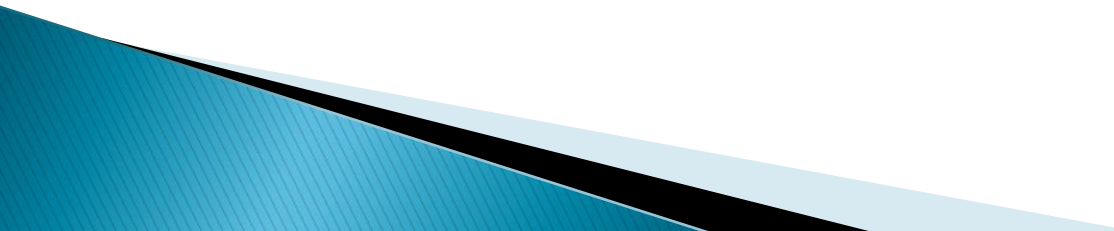


Figure 40.2 *Candidia albicans*: A hypha; B pseudohypha; C yeast cells budding.

# Isolation

- ▶ *Blood agar or Sabouraud* dextrose agar with and without inhibitors
  - ▶ Incubated at 37°C, aerobically, for up to 5 days
  - ▶ Isolation alone is not sufficient for a diagnosis of candidiasis
  - ▶ Presence of the organism, particularly psuedohyphae, in direct smears from lesion material is usually indicative
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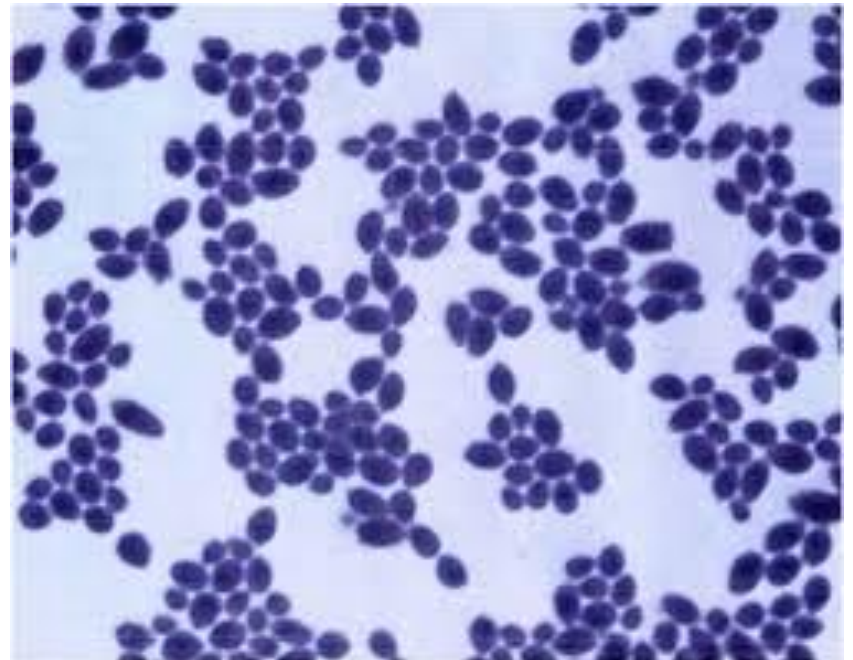
# Identification

- ▶ *Colonial appearance*- white to cream, shiny, high-convex colonies
- ▶ Pleasant ‘beery smell’

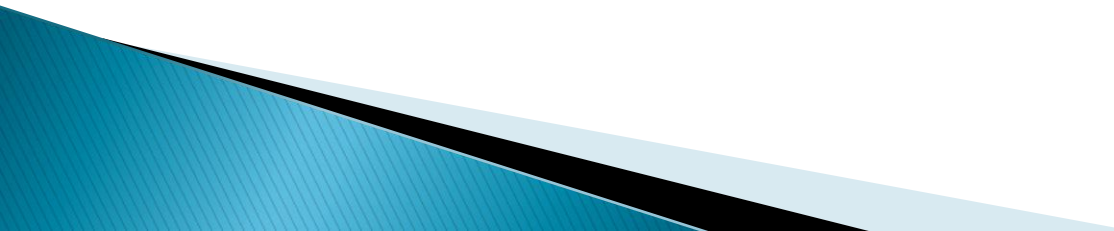


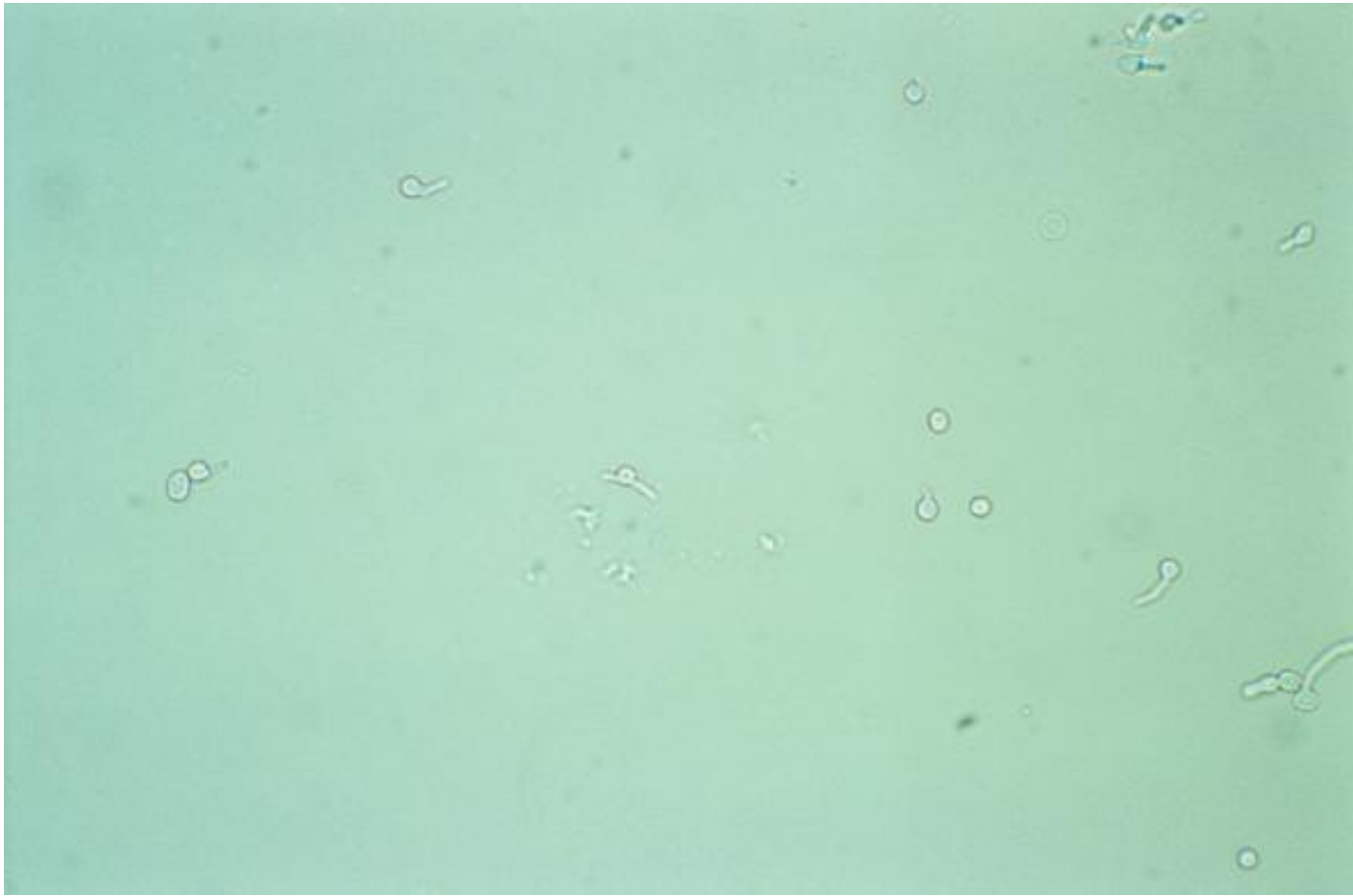
# Microscopic appearance

- ▶ Lactophenol cotton blue
- ▶ Gram or methylene blue stain
- ▶ *Candida albicans* produces thin-walled, budding yeast cells



# Demonstration of germ tubes

- ▶ A small inoculum from an isolated colony is suspended in 0.5 mL of sheep, bovine, rabbit or human serum
  - ▶ Incubated at 37°C, for 2 to 3 hours
  - ▶ A drop of the preparation is examined under the microscope
  - ▶ Small tubes will be seen projecting from some of the yeast cells
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# Chlamyospore production

- ▶ A plate of cornmeal Tween 80 or chlamyospore agar is inoculated by making three parallel cuts in the medium 1.0 cm apart
- ▶ The cuts are made at 45° to the surface to facilitate later microscopic examination
- ▶ Subsurface inoculation is made as chlamyospore production is enhanced by lowered oxygen tension
- ▶ Incubated at 30°C – 2-4 days
- ▶ A thin cover slip is placed on the surface of the agar and the preparation examined under the microscope for the thick-walled chlamyospores (8–12 μm) borne on the tips of pseudohyphae
- ▶ Clusters of smaller blastospores may also be present

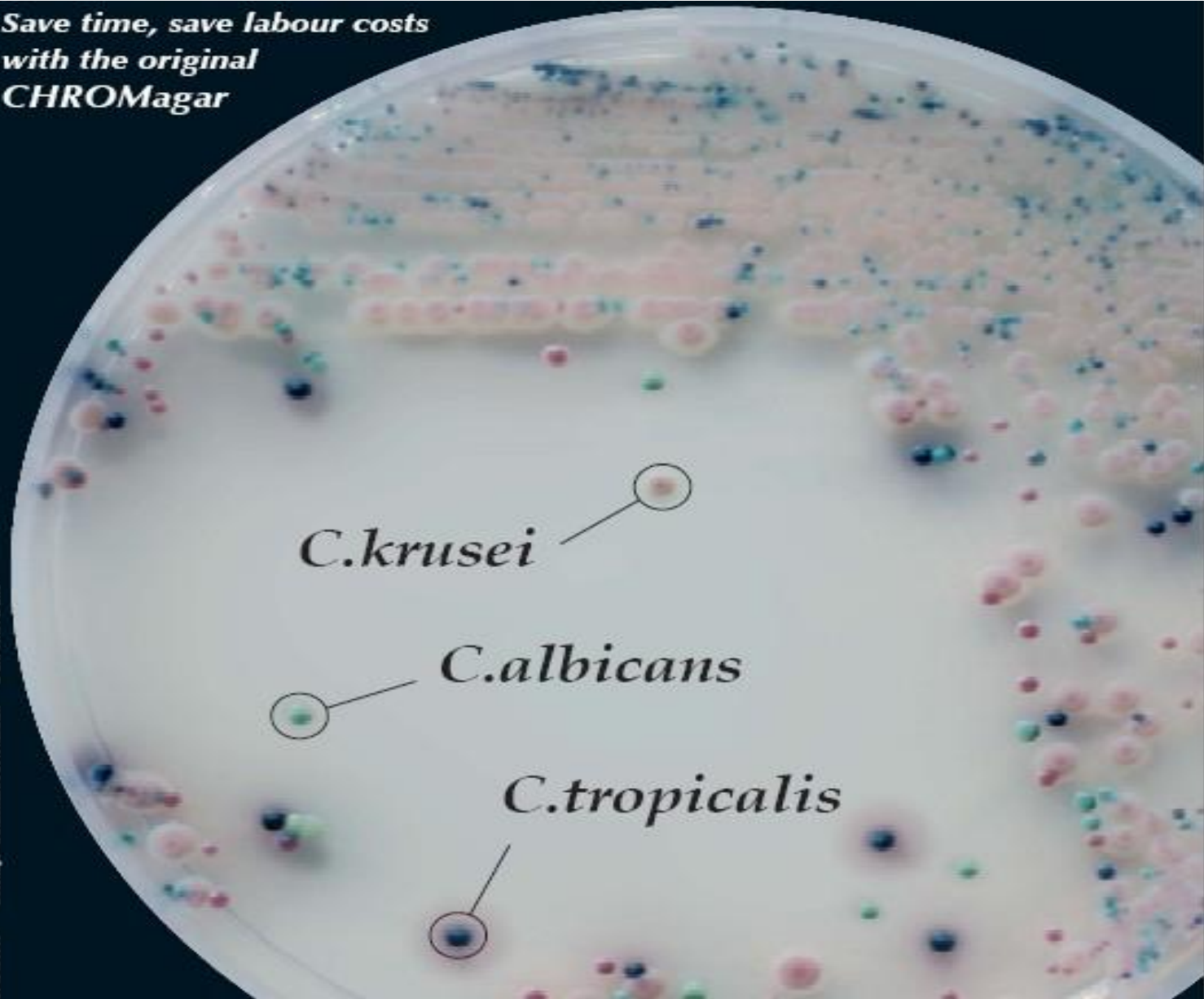


*Candidia albicans*: thick-walled terminal chlamydospores, pseudohyphae and two clusters of smaller blastospores

# Biochemical tests

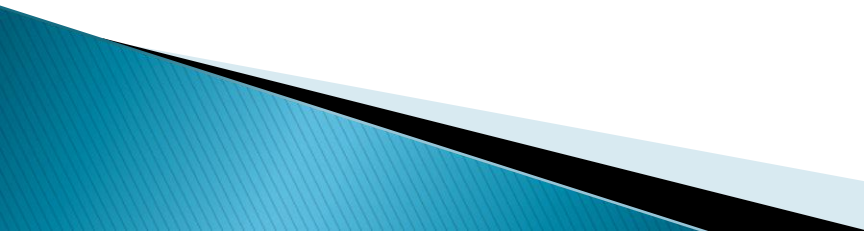
- ▶ Conventional biochemical tests can be used or commercial systems such as API 20C, API-yeast-Ident (bioMerieux) and Uni-Yeast-Tek system (Remel)
- ▶ CHROMagar™ Candidais a commercial agar designed for the differentiation of *C. albicans*, *C. tropicalis* and *C. krusei*

Save time, save labour costs  
with the original  
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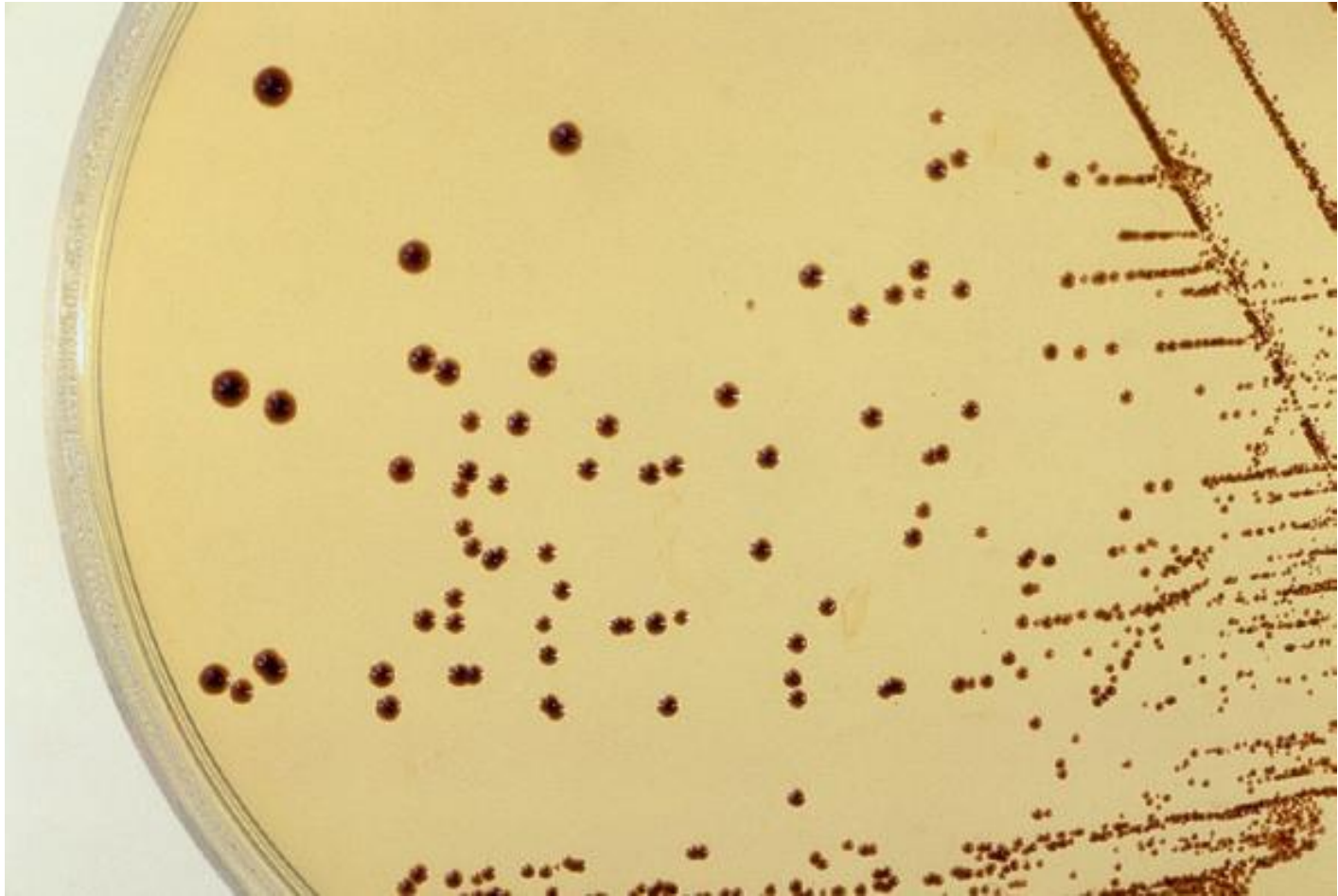


# BiGGY agar

- ▶ Bismuth sulphite glucose glycine yeast (BiGGY) agar
- ▶ Isolation / presumptive identification of *Candida species*
- ▶ *Most bacterial contaminants are inhibited* by the bismuth sulphite
  
- ▶ *Candida albicans, C. krusei and C. tropicalis strongly reduce the bismuth sulphite to bismuth sulphide*

- ▶ *Candida albicans* gives smooth, circular, brownish colonies with a slight white fringe and no colour diffusion into the surrounding medium
  - ▶ The colonies of *C. tropicalis* are similar but there is diffuse blackening of the medium after 72 hours
  - ▶ *Candida krusei* gives large, flat, wrinkled, silvery, brown-black colonies with a brown periphery and yellow diffusion into the surrounding medium
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# Molecular techniques

- ▶ Although molecular techniques for the identification of *Candida species in clinical veterinary samples* have been developed , they are largely used as research tools in mycology reference laboratories