PUBLIC HEALTH DIVISION

SECTION A.

District Work - Willesden.

January to April, 1938

Monday, January 24th
Monday, January 31st
Monday, February 7th
Monday, February 14th
Monday, February 21st
Monday, February 28th
Monday, March 7th
Monday, March 14th
Monday, March 21st
Monday, March 28th
Monday, April 4th

Monday, April 11th - Both sections of the class visit Willesden Municipal Hospital, Brentfield Road, Neasden, N.W.10, at 10 a.m. (Train to Stonebridge Park Station - L.M.S. or Bakerloo - and then No.18b 'bus along North Circular Road - 1d. Fare).

On Monday, January 24th, the Willesden section of the class should attend at the Willesden Health Department, 54, Winchester Avenue, Kilburn, N.W.6, at 10 a.m. (No.1 'bus).

PUBLIC HEALTH DIVISION

Supplementary visits for members of the D.P.H. class not taking the Mental Deficiency Course.
(~~Section A.~~)

Monday, March 7th	Visit Kensington District. Meet at Wood Lane Tube Station at 2 p.m. to inspect the Kensington Borough Council disinfecting station and vans and the refuse destructor.
Wednesday, March 9th	Visit Kensington District. Meet at Ladbroke Grove Station at 2 p.m. to visit the Kensington public swimming baths, slipper baths and washhouses, including a demonstration of the filtration, aeration and chlorination of swimming bath water; and to visit the Kensington cleansing station.
Thursday, March 10th	Visit Kensington District. Motor coach from School at 1.15 p.m. to visit the hostel of the National Children Adoption Association, the Kensington Baby Hospital, the Notting Dale School Treatment Centre and Infant Welfare Centre, the Notting Dale Nursery and the Rheumatism Clinic at the Princess Louise Hospital for Children.
Friday, March 11th	Visit Smithfield Meat Market Meet outside Meat Inspector's Office, 79, Charterhouse Street, E.C.1. at 2.15 p.m.
Monday, March 14th	Visit the Express Dairy's Certified Milk Farm, Finchley, and their Pasteurising and Bottling Centre, Cricklewood. Motor coach from School at 2.15 p.m.

SOME DEFINITIONS.

THALLUS: The vegetative part of a fungus.

HYPHA: A thread-like portion of thallus.

MYCELIUM: A network or feltwort of hyphae, usually any collection of hyphae.

CONIDIUM: A non-sexual, dormant spore formed by lateral budding from or by cutting off the apex of a hypha.

CHLAMYDOSPORE: A resting "spore" formed by protoplasm and food matter collecting in one segment of a hypha at the expense of the adjoining segments. The segment is then walled off from the remainder of the hypha and develops a thick wall forming a resistant spore which remains in situ while the attached hypha dies off.

ASCUS: A cell or cyst containing a definite number of ascospores, formed after a sexual conjugation of cells (gametes).

ASCOSPORE: Spore resulting from sexual conjugation and contained within an ascus.

PERITHECIUM: A closed structure inside which the asci develop in certain of the Euascomycetes, found amongst the Perisporaceae in the genera Aspergillus and Penicillium, as well as in many other genera not dealt with.

HOMOTHALLIC: Referring to conjugation of branches from the same mycelium (the same colony or strain).

HETEROTHALLIC: Referring to conjugation of branches from different mycelia (different in sign or sex) arising from different colonies or strains.

ISOGAMOUS: The conjugating cells are morphologically similar.

HETEROGAMOUS: The conjugating cells are morphologically (and possibly also sexually) dissimilar.

SPORANGIUM: The body containing the asexual spores (sporangio-spores) found in many of the Phycomycetes, including the Mucoraceae.

COLUMELLA: A structure bulging into the basal part of the sporangium and forming the upper part of the sporangiophore.

SPORANGIOPHORE: The hypha or stalk which bears the sporangium.

SPORANGIOLA: Small, usually few-spored, sporangia without columella, arising from branchlets of the sporangiophore (in Thamnidium).

ZYGOSPORE: The sexual spore of the Zygomycetales (which include the Mucoraceae). See illustration of development, also Progametangium, Gametangium and Suspensor.

STOLON: Long, prominent, differentiated mycelial hyphae bridging over variable distances and usually provided with Rhizoids by which they are attached at the points of contact with the substratum.

RHIZOIDS: Little clusters of branching rootlets springing from the nodes of stolons and invading (if possible) the substratum.

FUGACEOUS: Fleeting (fragile).

FASCICULATE: Refers to hyphae grouped in bundles.

FUNICULOSE: Refers to hyphae twisted into rope-like structures.

ARTHROSPORE: Spores formed by close septation of the terminal portion of a hypha followed by fragmentation and the development of each isolated segment into a spore. These chains of spores are also called oidia.

SCLEROTIUM: A mass of hardened mycelium forming a solid body of various shapes, a resting or dormant structure in many fungi.

These definitions are partly restricted to the case of the fungi dealt with in the course.

D E R M A T O P H Y T E S.

Sabouraud's Synthetic Table of the Dermatophytes.

(1)	MICROSPORUMS -		
		(a) With small or medium cults.	Human origin.
		(b) Vigorous cults.	Animal origin.
(2)	TRICOPHYTONS -		
	(a) Endothrix -		
		(1) Endothrix pure	Common species.
			Rare or foreign species.
		(2) Neo-Endothrix	Preservation of early characters.
	(b) Ectothrix		
		(1) Microides or Microsporoides	Gypseum group, (powdery) Niveum group, (duvetted).
		(2) Megaspores	Velvety group.
			Faviform group.
(3)	ACHORIONS -		
		(1) Achorion Schönleinii	Peculiarly human parasite.
		(2) Achorions of animal origin	Infection of man rare and accidental.

D E R M A T O P H Y T E S.

Sabouraud's Synthetic Table, continued.

MICROSPORUMS.

Microsporum pure, of the human type	M. AUDOUINI M. umbonatum M. tardum M. velveticum
Neo-microsporums of animal origin preserving for a long time their young parasitic form	M. LANOSUM M. felineum M. equinum M. fulvum M. villosum M. pubescens M. tomentosum

TRICOPHYTONS.

Endothrix pure.

Common species	T. CRATERIFORME T. ACUMINATUM T. VIOLACEUM
Rare or foreign species	T. effractum T. fumatum T. umbilicatum T. regulare T. SULFUREUM T. polygonium T. exsiccatum T. circumvolutum T. pilosum T. glabrum

Neo-endothrix.

Preserving the early or parasitic form	T. CEREBRIFORME T. plicatile.

Ectothrix.

Microides	Gypseum type	T. ASTEROIDES T. radiolatum T. lacticolor T. granulosum T. farinulentum T. persicolor
	Niveum type	T. RADIANS T. denticulatum
Megaspores	Velvety culture	T. ROSACEUM T. vinosum T. EQUINUM T. caninum
	Faviform culture	T. OCHRACEUM T. album T. discoides

ACHORIONS.

The Achorion of human favus	A. SCHÖNLEINII
Animal achorions	A. gallinae A. quinckeanum A. gypseum

The D E R M A T O P H Y T E S

(Classification of OTA and LANGERON).

ALEURIES TYPICAL and NUMEROUS -

Isolated or in clusters	Usually no spindles or accessory organs	TRICOPHYTON
	Spindles and other structures - spirals, nodular and pectinate organs	SABOURAUDITES

ALEURIES IMPERFECT

and isolated	(a) Spindles numerous and typical	EPIDERMOPHYTON
	(b) No spindles	
	1. Typical arthros and accessory organs (chlamydospores, clubs, etc.	GRUBYELLA
	Arthrospores without accessory organs -	
	2. Arthrospores well defined in chains	BODINIA
	3. Arthrospores badly defined	ENDODERMOPHYTON

The Sub-genera of SABOURAUDITES

With both Aleuries and spindles	(a) With nodular organs	Closteramma
	(b) Without nodular organs	Aleurocloster
With Aleuries and Nodular Organs but no Spindles		Aleuramma

The D E R M A T O P H Y T E S

(Classification of OTA and LANGERON).

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D E R M A T O P H Y T E S.

Sabouraud's Synthetic Table, continued.

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TRICOPHYTONS.
Endothrix pure.

Common species	T.CRATERIFORME T.ACUMINATUM T.VIOLACEUM
Rare or foreign species	T.effractum T.fumatum T.umbilicatum T.regulare T.SULFUREUM T.polygonium T.exsiccatum T.circumvolutum T.pilosum T.glabrum

Neo-endothrix.

Preserving the early or parasitic form	T.CEREBRIFORME T.plicatile.

Ectothrix.

Microides	Gypseum type	T.ASTEROIDES T.radiolatum T.lacticolor T.granulosum T.farinulentum T.persicolor
	Niveum type	T.RADIANS T.denticulatum
Megaspores	Velvety culture	T.ROSACEUM T.vinosum T.EQUINUM T.caninum
	Faviform culture	T.OCHRACEUM T.album T.discoides

ACHORIONS.

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Animal achorions	A.gallinae A.quinckeanum A.gypseum

YEAST FUNGI

The YEAST CELL may be seen isolated, in a colony group or chain or as a segment of a mycelial hypha. Its outline may be round, oval or elongated. Its vesicular NUCLEUS can be demonstrated after staining with Heidenhain's iron haematoxylin or Delafield's haematoxylin. A very prominent feature of many yeast cells is the large VACUOLE which may occupy the greater part of the cell; in its contained liquid float METACHROMATIC GRANULES, and these granules can be seen to originate from the cytoplasm at the margins of the vacude. The CYTOPLASM of the young yeast-cell is dense and homogeneous, but as the cell grows it becomes vacuolated and spongy; the vacuoles containing various metabolic products, of which glycogen and fats are the most easily determined. In the early stages of fermentation the cytoplasm of a brewing yeast becomes loaded with glycogen so that the large vacuole of the metachromatic bodies and other prominent cell structures are completely masked. This glycogen is quickly used up in the reproductive processes of the yeast. Fats are produced by many species of yeasts, and in the yeasts commonly called Torula may be present in large amount forming a very prominent feature of the cell. The production of fats and of proteins by yeasts has been exploited commercially, in times of food shortage, for the preparation of cattle fodder etc. Small quantities of fat may also result from egenerative changes. Lipoidal granules, basophil grains of unknown function and a variety of metabolib products may also occur in the cytoplasm.

The CELL MEMBRANE is thick, presenting a double contour and, in some species shows a granular structure. A mucilaginous CAPSULE is developed by some yeasts, particularly those commonly called Torula in which it is a very striking feature, especially when the organisms are present in animal lesions.

Vital staining of yeasts: Neutral red in 1/10,000 solution. Place some of the yeast culture in a drop of the stain and mount directly. Methylene blue, Toluidine blue etc. may also be used.

To demonstrate glycogen: Yeast culture introduced into a drop of Lugol's iodine solution, mount directly.

Gueguen's Triple Stain:

Soudan III	0.1 gm.
Lactic Acid	100.0 gm.
Dissolve with heat and add	
Cotton Blue	0.1 gm.
Tr. iodi	30 drops.

Filter and protect from light.

Mount the yeasts directly in a drop of this stain: the yeast cells will be stained blue, the fats red and the glycogen brown. Smears of yeast cultures fixed by alcohol etc. may be stained by Gram's or Giemsa's methods , or by Sahli's borax methylene blue.

REPRODUCTION

Commonly by BUDDING, in a few species (Schizosaccharomyces) by FISSION only, and in a few (Saccharomycoides) by both budding and fission.

Sexual reproduction occurs, in the perfect forms, by ASCUS formation which may be preceded by conjugation of the fertile cells (as in Schizosaccharomyces, Zygosaccharomyces, Eremascus etc.) or a vestigial conjugation (as in Endomyces fibuliger and Schwanniomyces), or, most commonly, the yeast cell becomes an ascus without any preceding conjugation (as in Endomyces generally and Saccharomyces). The ascospores in the ascus may number from 1 to 4 or 8, usually 4 or a multiple of 4. Amongst the Saccharomycetaceae (except Saccharomycopsis) the ascospores usually have a single cell membrane and amongst the Endomycetaceae a couble cell membrane.

The determination of ascus formation is of the greatest importance in the morphological study of yeast species.

With individual yeasts the development of asci may be favoured by growth on a particular culture medium, e.g. carrot, milk-agar, beer-wort-agar etc. and some species will only spore on certain media. In general, ascus formation may be induced by growing the yeast on a rich medium for several generations and then transferring the active culture to some non-nutrient or poorly nutrient medium such as moistened filter paper, moistened gypsum discs or Gorodkowa's medium.

In individual species asci are formed only within certain temperature limits, lying within the temperature extremes for vegetation of the yeast.

Gorodkowa's medium for ascus production

Gelatine	1.0 grm.
Meat broth	1.0 grm.
Sod.chloride	0.5 grm.
Glucose	0.25 grm.
Distilled water	100.0 ccm.

For convenience of description, the yeast fungi of industrial or of pathological interest, to be dealt with, may be divided into four groups:

I. Yeasts producing asci but no true mycelium, SACCHAROMYCETACEAE.

II. Simple yeasts of various families not forming either asci or mycelium. Some of these may represent imperfect stages of yeasts belonging to Group I. Group II, which includes most of the pathogenic types, is referred to by various names but priority should be given to CRYTOCOCCUS Kützing 1833, emend. Vuillemin. However, they are frequently given the generic name TORULA Will emend. Harrison 1928.

III. Yeasts producing both asci and true mycelium, ENDOMYCES reess. This group is not of much pathological interest.

IV. Yeasts producing mycelium but no asci, MYCOTORULEAE Ciferri and Redaelli. Thought by many to be imperfect stages of fungi known in Group III, but there is little evidence to support this view. The mycotoruleae include the common causes of mycotic stomatitis (thrush) and certain skin affections.

TORULA histolytica

Group II, Cryptococcus Kützing, in part TORULA Will emend. Harrison.

Cells round, ellipsoidal or cylindrical, increasing by budding. Asci not formed. Cells usually contain large fat or oil globules. Colonies may be white or pigmented, yellow, brown or black. A mucinous material is developed around the cells forming a matrix of the colony and giving to it a semi-liquid consistency, so that a well developed colony on a glucose agar slope may flow to the bottom of the slope to form a pool of semi-liquid culture. In animal lesions the pathogenic species (usually not pigmented) develop thick mucinous capsules giving the lesion a myxomatous character. In stained smears of matter from the lesion or from exudates, sputum etc. the yeast with its irregularly outlined pale capsule may be mistaken for a monomuclear leucocyte or a lymphocyte.

Yeasts of this group have been found causing natural infections of man and horse in widely different parts of the world. In man the lesions may be in the subcutaneous tissues, cancellous bones, periosteum, peritoneum etc. but the organs most frequently attacked are the lungs and central nervous system. The common site of entry is the lymphatics of the tonsil or fauces following a severe anginous "thrush", then via cervical glands to pleura and lung and later the meninges and brain. The changes caused by the yeast in lung tissue are histolytic with reactive fibrosis and not acutely inflammatory.

The disease affecting the lungs and meninges may very readily be mistaken for tuberculosis, clinically. The prognosis is very unfavourable.

Freshly isolated cultures when inoculated into rats usually cause a local myxomatous tumour.

mucoid Colorado
Horse — nose infection

MYCOTORULEAE Ciferri and Redaelli 1929, emend. Langeron and Talice.
(The members of this family are usually named in medical literature "monilia", a generic name not valid for them.)

Non-sporing yeast fungi developing pseudo-mycelium and true mycelium (from fragile chains of yeast cells to true mycelial filaments) branching and bearing budding yeast cells chiefly from the apices of the segments of the chain or filament.
Generic distinctions are based chiefly on the structure of the verticils of budding cells at the apices of the segments.

In the sparse growth with marked mycelial development seen in cultures in potato water, or in the deep growth penetrating into the substance of a glucose agar slope, the generic characters are easily determined, but in the luxuriant, rapidly progressive growth on the surface of a glucose agar slope, which consists almost entirely of accumulated budding yeast cells, the generic characters are difficult to determine.

Asci are not formed, but resistant or "durable" cells, much larger than the budding cells, develop in ageing cultures from the ends of filaments or branches. These thick-walled cells with clear contents have the morphological significance of chlamydospores. The mycotoruleae are active fermenters of sugars, and fermentation tests have been used to differentiate species, but such tests should be resorted to only after the most exhaustive morphological study and the identification of the genus.

Differentiation on antigenic structure presents many difficulties for there are common antigens linking up not only members of this family but other groups also. By the serum precipitin absorption technique species groups may, however, be dfined.

Pathogenicity: These fungi are common causes of "thrush" attacking any part of the bucco-glosso-pharyngeal mucosa. In the thick easily detached brownish membrane the fungus may be seen ramifying amongst the superficial layers of the epithelium - thick, segmented, branching mycelium bearing branching clusters of budding yeast cells at the apices of the segments. The fungus may also attack the mucosa of the oesophagus, stomach and intestine, and, possibly, also the lungs; but the numerous reports of "pulmonary moniliasis" rarely contain convincing evidence. The mycotoruleae also cause dermatitis, often simulating ringworm, affecting cheifly the moist areas of the skin - the groin and axilla, clefts of the toes and fingers, nail folds, inframammary region etc. but also, occasionally, the drier areas. The infection resembles thrush in its pathology; the fungus growing in the superficial epithelium and causing thickening and redness or soddenness of the skin, often with vesication and scaling, and sometimes (in infections of nail fold), suppuration. The infection assumes many clinical forms.
The mycotoruleae are common saprophytes or harmless parasites of the mouth and alimentary canal and on the skin of healthy persons. They also occur as secondary invaders of lung cavities, glandular tumours etc. Their presence in these situations may lead to erroneous diagnoses, especially when, as a result of intestinal harbourage of the fungus, mycotorula antibodies are demonstrable in the blood.

Genus Mycotorula Will 1916, Cif. and Red. 1929, emend. Langeron et al. Type species, Mycotorula albicans Ch. Robin 1953 (many synonyms).

Yeast in the sputum does not mean anything — lung abscess you get yeast.