Laboratory Identification of Pathogenic Fungi Simplified

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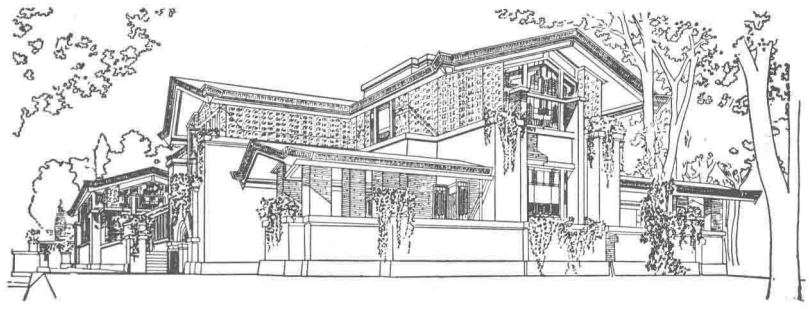

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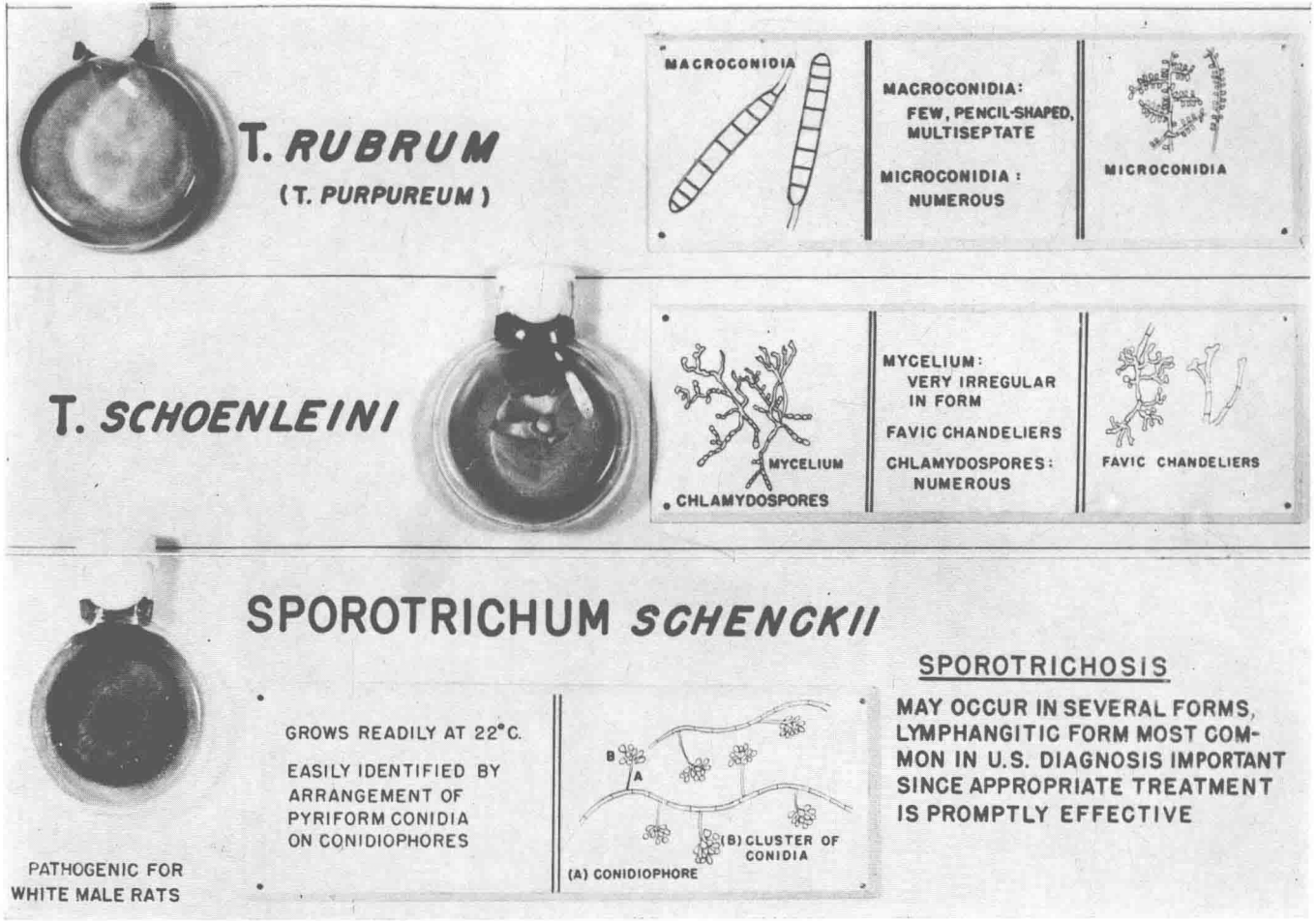

Detail of our teaching exhibit. Replaceable flasks of growing colonies accompany the diagrams.

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A Monograph in

AMERICAN LECTURES IN TESTS AND TECHNIQUES

Edited by

GILBERT DALLDORF, M.D.

Director, Division of Laboratories and Research
New York State Department of Health
Albany, New York

To Dr. Rhoda W. Benham

who has been a constant source
of inspiration and encouragement.

Preface

THIS MONOGRAPH is the outgrowth of an experience in teaching diagnostic mycologic methods to students who had been trained in bacteriologic procedures but who had little or no experience in the field of mycology. Some students were assistants in this laboratory; some were visitors from other laboratories; and some were physicians preparing to direct local laboratories in New York State. All wished to become familiar in a short time with the essential procedures and criteria in the identification of the incitants of fungus infections.

As a visual aid in this program of instruction, the exhibit panel shown in the *Frontispiece* was designed to present the characteristic features upon which the identification of the pathogenic fungi is based. Giant living colonies and diagrammatic drawings of the microscopic structures familiarized the students with the morphology of the fungi. The exhibit was also used effectively in lecture-demonstrations to medical students. Later, as a matter of convenience, photographs of the individual sections of the exhibit were bound, with a supplementary text, as a manual for use at the laboratory bench. Impetus to make the manual more widely available came from the response of members of the New York State Association of Public Health Laboratories to whom it was shown at the Annual Meeting in 1952. In the present book photomicrographs replace the drawings of the original exhibit. Tabular and other textual descriptive information has been added, together with formulae of the essential culture media and a selective list of references. The objective remains the same as in the earlier presentations, namely, an aid to the teaching of the essentials in the identification of the pathogenic fungi to the beginner and a bench companion for the bacteriologist engaged in mycologic diagnosis.

Only those pathogenic fungi commonly encountered in North America are included in this work, and all illustrations are from cultures studied in this laboratory. The pathogenic fungi are, with few exceptions, members of the class of Fungi Imperfecti, that is, fungi in which the sexual spore has not been demonstrated. Identification is based upon asexual spores, the conidia,

which are borne on specialized hyphae (conidiophores). The diseases caused by the pathogenic fungi have been roughly classified into superficial and systemic or deep-seated mycoses.

In publishing this monograph our appreciation goes to the students whose responses have helped us to sharpen the various presentations. Acknowledgment is also made to our colleagues whose encouragement and valuable assistance are responsible for the decision to offer to others this outline of a practical laboratory experience.

E. L. H.
F. C. R.

Contents

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Superficial Mycoses

Dermatophytoses (Ringworm)

THE SUPERFICIAL MYCOSES are the most common and widely distributed of all fungus diseases. They are confined to the keratinized layers of skin and its appendages, but nevertheless are of major importance, since they are so widespread and may cause great discomfort and even at times are very disabling.

These diseases are incited by a group of fungi, the dermatophytes, embracing many species. The isolation and identification of the fungus from scrapings from skin lesions, infected nails, or from stubs of broken hairs are essential to specific diagnosis.

This group of fungi is represented by three genera, based upon the type of macroconidia (fuseaux) formed, Microsporum, Trichophyton, and Epidermophyton.

MICROSPORUM

THE GENUS MICROSPORUM consists of three recognized species, *Microsporum audouini, Microsporum canis,* and *Microsporum gypseum.* They attack hair and glabrous skin. These fungi are the chief incitants of ringworm of the scalp (tinea capitis) among children in the United States. The infected hair shows a sheath of spores in the form of a mosaic about the hair shaft (ectothrix type), and under filtered ultraviolet light (Wood's lamp) there is a brilliant green fluorescence. In the infected skin, segmented branching mycelium is found. These fungi are usually easily isolated on Sabouraud's glucose medium at room temperature.

They form cottony or downy, matted or powdery aerial mycelium, and vary in color from white to grayish-white, or buff to various shades of brown.

They produce characteristic, large, thick, rough or smooth-walled, multiseptate, spindle-shaped macroconidia (fuseaux), and small, single-celled, clavate spores, attached directly or to short sterigmata on the sides of the hyphae; pectinate hyphae, nodular bodies, racquet hyphae, and chlamydospores are also formed.

MICROSPORUM AUDOUINI

Media for Development of Significant Characters

MACROSCOPIC	
Sabouraud's glucose agar.	Flat, grayish-white, velvety, aerial mycelium (with button in center); rose-brown pigment on under-surface.
Polished rice grains.	No aerial mycelium, brownish discoloration of grains.

MICROSCOPIC	
Corn meal agar.	Pectinate hyphae.
Honey agar plus yeast extract (5 mg./ml.).	Macroconidia, microconidia.