ROLE OF PITYROSPORUM IN SKIN DISEASES

THESIS

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BY

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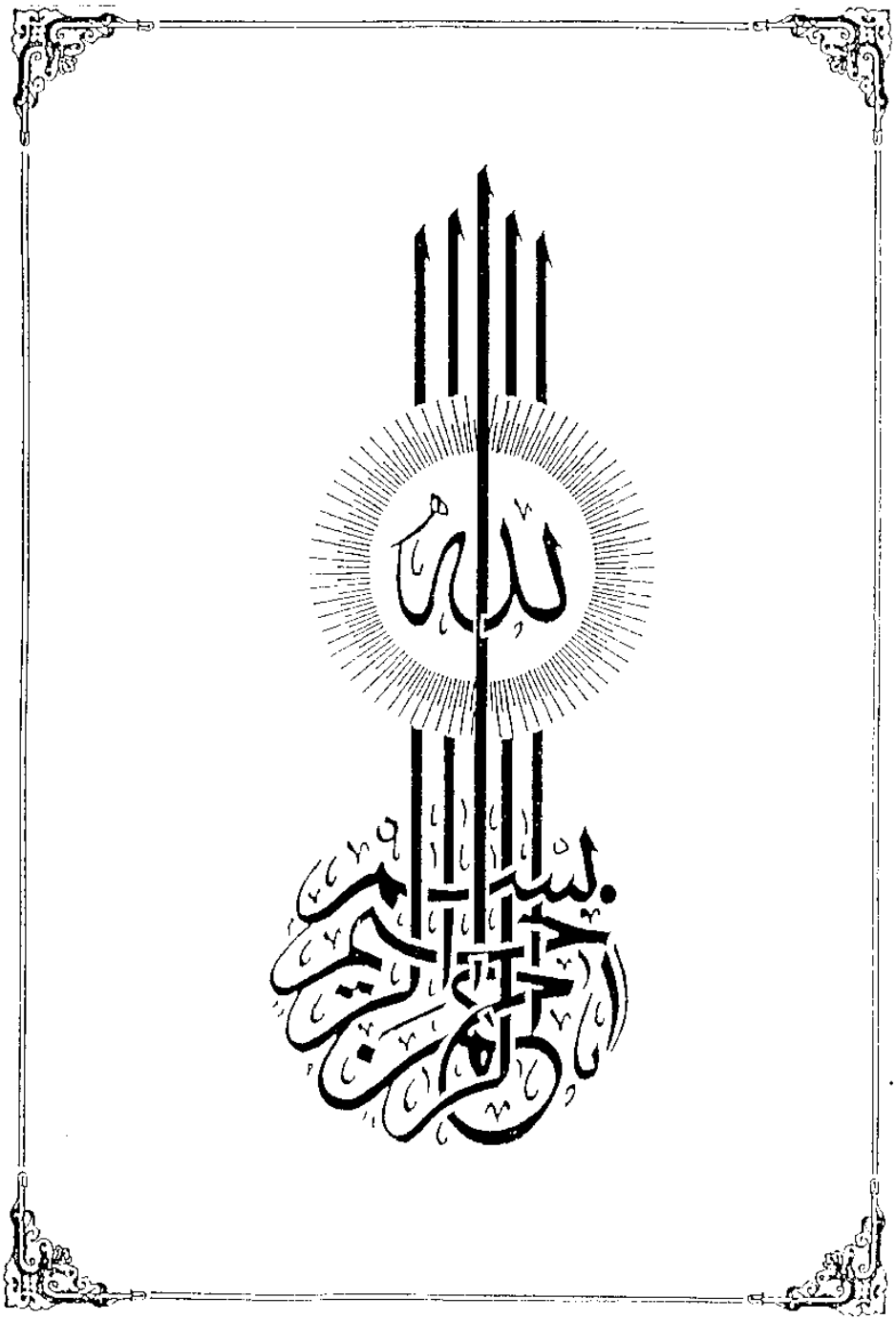

To
my parents

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Introduction

INTRODUCTION

Fungi had assigned a niche in the distant corner of the plant kingdom, under which genus *Pityrosporum* (*P.*) is found.

Genus *Pityrosporum* belongs to family *cryptococcaceae*. It contains two species which are lipophilic dimorphic yeasts, *P. ovale* and *P. orbiculare*, and a third one *P. pachydermatis* which is not lipophilic (Faergemann and Bernander, 1979).

Faergemann *et al.* (1983 b) mentioned that *P. orbiculare* and *P. ovale*. Probably represent different morphological forms of the same organism.

The aetiological role of *P. orbiculare (P. ovale)* in pityriasis versicolor is well established (Gordon, 1951 a; Mcginly *et al.*, 1970 and Faergemann *et al.*, 1982). It changes from the usual oval or rounded blastospore to form the mycelial form (Faergemann and Fredriksson, 1981). During recent years the role of *Pityrosporum* yeast in many other diseases, both as a direct infectious agent or as a trigger factor, has been proposed. *Pityrosporum* folliculitis is now documented as a separate disease (Potter *et al.*, 1973 and Ford *et al.*, 1982). In *Pityrosporum* folliculitis the yeast increases in number, but usually remains in the blastospore form (Back *et al.*, 1985).

In seborrhoeic dermatitis, *Pityrosporum* is usually in the yeast form, although the presence of hyphae has been reported (Mcginley *et al.*, 1975). It has also been associated with confluent and reticulate papillomatosis (Faergemann *et al.*, 1980), also Some forms of Psoriasis (Rosenberg and Belew, 1982), atopic dermatitis of head and neck (Waersted and Hjorth, 1983), and Onychia (Civila *et al.*, 1982).

The comedogenic potential of *Pityrosporum* lipid extract was discussed in 1970 by Weary and Charlottesville. Erythema annulare centrifugum like lesions with *Pityrosporum* infection has also been reported (Kikuchi *et al.*, 1984). Also, *Pityrosporum* systemic infections have been reported (Redline and Dahms, 1981).

The aim of this thesis is to review the role of *Pityrosporum* yeast in various skin conditions.

Review of literature

Pityrosporum yeast

PITYROSPORUM YEAST

A NORMAL SKIN FLORA

The light microscopists of the late nineteenth century were familiar with oval and round yeast like structures in scrapings from scaly scalps of patients with, for example, psoriasis and seborrhoeic dermatitis (Sloof, 1970). The initial suggestion that they had a causal role in those conditions came to be rejected as the oval yeast - by this time known as *P. ovale* - was recognized as a regular inhabitant on the skin of the healthy scalp. The idea that a particular micro-organism should exist as a harmless commensal at one time but become a pathogen at another was not yet appreciated at that old time (Roberts, 1986).

By the early 1960 when Marples was compiling her classic work " The ecology of human skin " it was generally accepted that P. ovale was a member of the resident of skin flora of the scalp, face and other sites and could be exonerated as a pathogen in psoriasis or seborrhoeic dermatitis. At that time it was known that *P.ovale* is lipophilic and lipid - dependent. Moreover Gordon's achievement in 1951 (a) of isolating from the lesions of pityriasis versicolor, a spherical lipophilic yeast which he called *P. orbiculare* was accepted and had been confirmed by Burke in 1961. These workers believed, as Marples, that *P. orbiculare* was the yeast phase of *Malassezia furfur (M. Furfur)* and they suspected on the basis of a few isolations from normal skin

that it would turn out to be a resident organism. However, their inability to persuade *P. orbiculare* to undergo yeast/mycelial transformation *in vitro* and absence of normal skin surveys, left these matters open to some doubt.

Since then the normal skin flora has been studied extensively. Using scraping stained with the Parker Quink/KOH technique; thick walled spherical yeasts, budding from a narrow base have been observed in 98% of normal adults, often in large numbers, on the chest and back (Roberts, 1969 b). Culture using olive oil over malt extract agar, yielded *P. orbiculare* regularly from these sites. The surface biopsy technique has been used to show how these organisms cluster in the infundibular region of hair follicles in crevices between Keratinocytes, while electron microscopy has amplified the knowledge of the precise location of this normal mycoflora (Noble 1981).

There are now grounds for believing that the skin is colonized by *Pityrosporum* species in the first few days of life, but that numbers of yeasts are low except in the scales of cradle cap, until later childhood. They probably rise to adult levels by the mid-teens. Faergemann and Fredriksson (1982) could culture *P. orbiculare* with ease at 15 years old persons having failed to isolate it in infancy.

The apparent increase in numbers of yeast seems to follow the known increase in sebum production due to sebaceaus activity at puberty, also the number of yeasts/cm² over the skin reaches the peak at the age of 30 years then decrease with the increasing of age which reflect the variation in composition of skin lipid with age advancement (Bergbrant and Faergemann 1988).

In most subjects the spherical yeast *P. orbiculare* predominates on the chest, back and upper abdomen, while the scalp and face carry a population in which *P. ovale* is dominant. Both forms are however, widely scattered on the body surface but simple microscopic assessment suggests that they are fewer in number on the limbs and extremities. The proximal flexures seems to carry high numbers, particularly of the oval form (Faergemann *et al.* 1983 a; Roberts 1986).

In the scaly lesions of pityriasis versicolor the causative fungus was found as yeasts and hyphae. Filaments identical to these, but in smaller numbers may be seen in scrapings taken from unaffected skin of patients with pityriasis versicolor, and similar structures may be observed in scrapings taken from normal subjects (Roberts 1969 a).

Neither *P. ovale* nor *P. orbiculare* seems to have any other regular habitat away from the human skin. Though *P. ovale* has been isolated from the coat of the llama as well as from cats, dogs and horses. *P. orbiculare* survives reasonably well in dry conditions and was cultured from skin scrapings up to 4 weeks old kept at room temperature. *P. ovale* seems to be rather more durable. It is sometimes possible to isolate *Pityrosporum* species from bed linen and clothing but the extent of its viable presence in the environment is not known. *P. pachydermatis* has occasionally been isolated from damaged human skin but doesn't seem to be either regular commensal or a definite pathogen in that sites, its natural habitat being the skin of a variety of animals (Brotherton 1967).

MORPHOLOGY

Fungi may be unicellular, for example the **yeasts**, or the cellular units may be connected together to form long filaments of **hyphae** as in the common moulds. In terms of intracellular organization yeasts and moulds are essentially similar and under certain conditions some yeasts may become filamentous and some moulds may grow and multiply as yeasts.This ability to change form is known as **dimorphism.**

Hyphae are usually divided into cells by cross walls or septa. When the interwoven mass of hyphae remains only loosely arranged it is known as mycelium (Roberts and Mackenzi, 1986).

Yeasts are usually spherical to ellipsoidal and vary in diameter from 3-15 um. Most yeasts reproduce by budding, although few undergo division by binary fission. The budding process is initiated when the yeast cell wall softens at a specific point as a result of localized lysis of cell wall. The internal pressure on this area of weakened cell wall causes the wall to balloon outward.

This swollen portion enlarges and following nuclear division, a progeny nucleus migrates into the newly formed bud. The bud may then continue to enlarge. The cell wall grows together at the constricted point of attachment.