GENITAL MYCOPLASMOSIS

Thesis

Submitted For Partial Fulfilment of

The Requirement of M.S. Degree

(Dermatology & Venereology)

BY

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M.B.B.Ch.

Under Supervision of

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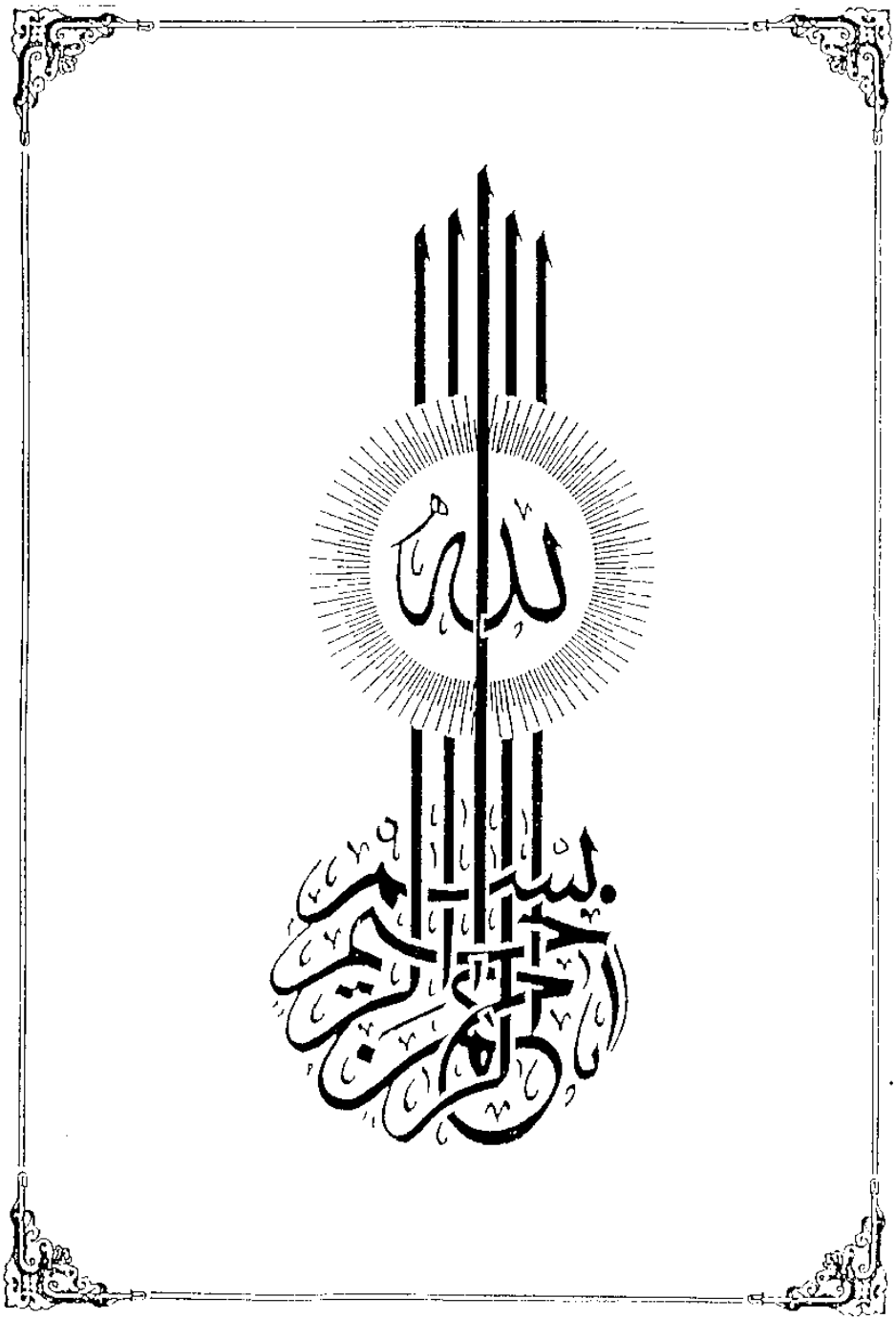

ACKNOWLEDGEMENT

I was greately honoured to work under the supervision of Dr. **Mona El-okbi,** Professor of Dermatology and Venereology, Ain Shams University, whose supervision, confident and constructive guidance made the accomplishment of this work possible.

I wish to express my deepest thanks and sincere gratitude to Dr. **Hussein Abdel Dayem,** Lecturer of Dermatology and Venereology, Ain Shams University for his close supervision and generous effort during the whole work.

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INTRODUCTION

Mycoplasmas are small procaryotic cells, probably the smallest to be able to grow in cell - free culture media. It is only in the past few years that convincing evidence has appeared linking these organisms to disorders of the human genital tract and human reproductive failure (Taylor - Robinson and Mc Cormack, 1980). Genital mycoplasmas have now been associated with non - specific urethritis, acute salpingitis, septic abortion, post partum fever, pelvic inflammatory disease, cervicitis, vaginitis, Reiter's disease, Bartholin's abscess and more recently with prematurity, low birth weight infants and infertility.

Mycoplasmas are widely distributed in nature and have been detected in man, animals and other sources as soil and sewage.

They are of particular importance to veterinary microbiologists as among their various species some may cause important infection in the respiratory tract, mammary glands and genital tracts, or synovia

of cattles, sheep, goats, cats, mice, rats, swine and birds.

The plant mycoplasmas, although, as yet, not well characterized, are associated with various insect transmitted disease (e.g. aster yellow) were previously thought to be viral.

Till now eight recognizable species of human mycoplasmas are known T-mycoplasmas, Mycoplasma hominis and to a lesser extent Mycoplasma fermentans which has been discovlered from human genital tract. Mycoplasma pneumonia responsible for primary atypical pneumonia Mycoplasma orale type I, Mycoplasma orale type II Mycoplasma orale type III and lastly Mycoplasma salivarium are oropharyngeal commensals (McCormack, et al., 1973).

HISTORICAL REVIEW

Mycoplasmas were named as pleuro-pneumonia group of organisms or pleuro pneumonia - like organisms (PPLO).

The first member of the group, today known as Mycoplasma mycoides, was isolated by Nocard and Raux in 1898, its morphological characteristics were described later by Bordet in 1910.

In 1937 Dienes and Edsall reported the isolation of a mycoplasma, probably mycoplasma hominis from an abscess of Bartholin's gland.

This was the first reported isolation of a mycoplasma from a human being. Since then mycoplasma has been found to be a common inhabitants of the oropharyngeal and genital mucous membranes (De Louvois et al., 1974 and Matthews et al., 1975).

Tiny mycoplasma or T-strain was described by Shepard in 1954.

It is very small organisms capable of producing a very small colony in culture.

MICROBIOLOGY

In 1959, Edward and Freudt proposed that these organisms called pleuropneumonia - like organism (PPLO) should be brough together under a new genus Mycoplasma in the family Mycoplasmataceae. This family has now been placed in the order Mycoplasmatales within the class Mollicutes (Edward and Freudt, 1969).

Until recently, the family mycoplasmataeceae consisted of a single genus, Mycoplasma; However the family has now been divided into two separate genera, Acholeplasma and Mycoplasma.

This subdivision is based upon the difference in the requirement of sterol among the species in the family Mycoplasmataceae. Thus a few of the species species do not need sterol for their growth (Acholeplasma), while the majority of them do (Mycoplasma). (Hayflick and Chanok, 1965). It has also been suggested that the family Mycoplasmataceae should be divided into Acholeplasmataceae and Mycoplasmataceae (Freudt and Edward, 1971).

Ureaplasma species has been separated from Mycoplasma, species on the basis of their ability to hydrolyze urea, it also has the capacity to form very small granular colonies on agar, hence their original descriptive name of tiny or T strain mycoplasma (Stanbridge, 1976).

Characteristics of Mycoplasma:

1- The smallest reproductive unit have a size of 120 - 250 nm.

2- Highly pleomorphic because of lack of rigid cell wall.

3- Completely penicillin resistant but inhibited by tetracycline.

4- Can reproduce in cell-free culture media, on agar "fried egg" appearance.

5- Growth is inhibited by specific antibody.

6- It does not revert to or originate from bacterial parentral form.

7- It has affinity to cell membrane.

(Jawtiz et al., 1980).

Mycoplasma and Viruses ;

Certain biologic properties of mycoplasmas are shared with some viruses and, on occasion, have led to their being erroneously identified as viruses. These properties include ;

(a) The capacity to produce cytopathic effect in cell culture.

(b) Filterability through 220 nm membrane filters,

(c) Growth inhibition by specific antisera.

(d) Sensitivity to chloroform and ether.

(e) Ability to haemagglutination and haemadsorption.

(f) Production of chromosomal aberration and morphological changes in infected cell in cultures.

(g) Resistance to several antibiotics, and

(h) Ultrastructure similarities to certain enveloped viruses.

They differ from viruses in their ability to grow in cell free culture media and that they contain both RNA and DNA, Also they are susceptible to some antibiotics such as tetracyclines, chloramphenicol and lincomycin. (Stanbridge, 1976).

Mycoplasma and wall defective microbial forms;

Wall-defective Microbial Forms (WDMF) can result from spontaneous mutation or from the effect of chemicals such as enzymes and antimicrobials. These WDMF can be classified into ;-

(1) Protoplasts ; Are WDMF with external surfaces free of cell wall constituents, spherical, ostmotically fragile, usually are derived from gram negative rods.

(2) Spheroplasts, Are WDMF with external surface containing some cell wall material. They lack the rigid mucopeptide component of the cell wall. They are enclosed by other cell wall components.

(3) L. phase variants.; are WDMF which can replicate serially as non-rigid cells and produce colonies on solid media. Some are stable others are unstable and revent to the bacterial parent forms (Jawetz et al, 1980).

In 1935 Kleinberger - Nobel reported the isolation of organisms from a culture of strepto bacillus monilli - forms which produced colonies similar to those of PPLO.

She first believed that this so called (L) organism was a symbiotic mycoplasma; however, Dienes (1937) claimed that the organism was derived from streptobacillus monilliforms.

Since mycoplasma species are similar in some respect to the L. forms it is important to distinguish between them. The genome size of different species of mycoplasma including T. mycoplasmas was found identical and smaller than any genome size of bacteria (Black et al., 1960).

Perhpas the most fundamental difference between mycoplasma and L. forms lie in their metabolic activity. Although proteineous substances are needed by both for growth, yet none of the L. form variants were found to require cholesterol which is highly required for the growth of most mycoplasma (Edward and Nicol 1953).

Still more detailed studies have shown that the active serum components needed by mycoplasma are completely different from those needed by L. form variants (Edward and Nicol 1953).

Morphology, ultra structure and mode of division:

The mycoplasmas show polymorphic structure, depending on the method of examination (e.g. dark field Giemsa - stained film from solid or liquid media, agar fixation). Growth on fluid media gives rise to many different forms including rings, bacillary and spiral bodies, filaments and granules. Growth on solid media consists principally of protoplasmic masses of indefinite shape, easily distorted and often appearing as discs or globules which contain "chromatin - bodies" and dense granules. These different forms represent the smallest or the minimal reproductive units, that measure about 50-300 nm in diameter i.e. the size of a medium - sized virus. (Sabin, 1941; Edward 1954).

The normal plasticity (polymorphism) arising from the basence of a rigid cell wall should not be confused with pleomorphism which necessarily imply the existence of more than one distinct cellular form during the organism's life cycle. (Maniloff and Morowitz, 1972).