MILIARIA

THESIS

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by

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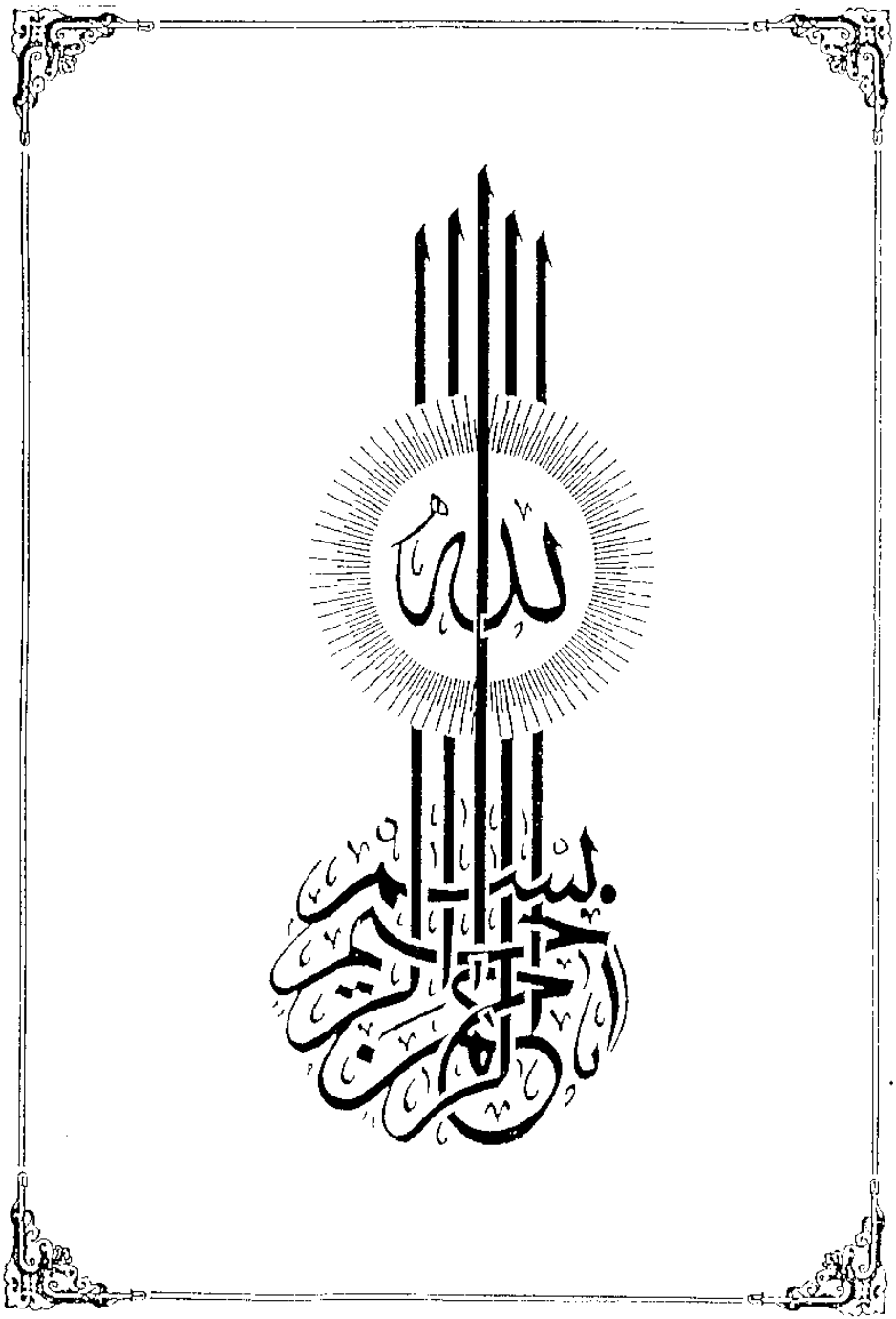

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The Candidate

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Miliaria is a sweat-retention syndrome which occurs in hot humid environment, most commonly during summer months. Four clinical types are present; namely miliaria crystallina, rubra, pustulosa and profunda. The great majority of cases is seen in infancy. It is an important cause of morbidity in certain occupations, particularly in the tropical areas. It is also a common problem during war time. The rash itself may be of minor importance in comparison to the heat intolerance syndrome which develops when large proportion of the sweat ducts are obstructed by repeated attacks of miliaria rubra.

The aim of this work is to present a thorough review of the history of the disease, the aetiology, clinical features, histopathology, pathogenesis and treatment of such a common dermatosis.

REVIEW OF LITERATURE

HISTORICAL REVIEW

The ancient Egyptians were well aware of skin disorders and believed that most of them arose from dietary indiscretions or from eating sacred animals. Living in a fairly dry climate, with clothing both light and easily washable, and with a high level of personal hygiene enjoined by religious beliefs, may be a reason why they were not particularly afflicted by disorders of sweating. Furthermore there appears to be no clear mention of a sweat rash in the various papyri which have been translated (Renbourn, 1959).

A high level of hygiene was equally common among the ancient Greeks, and like the Egyptians they were great believers in anointing the skin with oils and unguents. However, Hippocrates wrote in Greek in an Aphorism (section 3 : No. 21) "Of summer, certain of these (diseases) and continued ardent and tertian fevers, and especially vomiting, diarrhoea, opthalmia ... and the sudamina"; and it is the word 'sudamina' which opens up the long and varied history of the sweat rash or prickly heat (Renbourn, 1959).

Theophrastus (370 - 297 B.C.) described a disturbance of sweating as follows: "Working and moving about, and when in a state of plethora, produces a rash which the Greeks call 'Enodioi' (ἐνδοιοι); it breaks out in travellers especially on the limbs and sometimes on other places ... exertion makes it worse as shown by an inflammation ...

but if left alone it quickly disappears. Scratching produces a bad quality of sweat and is followed by a profuse rash. Therefore, it is advisable not to throw it in by irritating liquids-acid, acrid or salty - nor to administer, hot or cold baths, but simply to apply tepid applications". In the 'travellers rash'they have perhaps, the first description of the sweat rash or prickly heat (Renbourn, 1959).

In the "Natural History", Book XXIII, Pliny mentioned the cure of sweat papules (papulae sudores). He gave the earliest reference to a skin disorder known as 'boa' or 'bova', perhaps so called because of its cure by hot ox dung. Boa was to become 'bother', a term used, on occasion, by the Arabs and later physician to mean, amongst other things, the sweat rash.

In the Latin translation of the Canon (1556), 4th Book, Avicenna wrote on the 'bother' ('boa' of Pliny). He said: "Whosoever sweats profusely (desudationes), but with good digestion, may be affected in the cool of the night with obstruction of the pores of the skin, resulting in an itchy roughness and the papules of the small Bother, also called 'daughters of the night' (benat alleili; planta noctis; epinyctis). It is caused by the insufficient relaxation of the skin, increased by the condensing action of the cool night air when digestion is most active and when, therefore, transpiration should be most copious. In this disorder itching is most violent. At first,

scratching gives a feeling of gratification, but this is soon replaced by severe discomfort in the parts affected".

* * *

The word "miliaria' is derived from the Latin 'milium' or 'miliarus', meaning millet, the small seeds of which have been used since time immemorial, particularly in the East and countries around the Mediterranean basin, for food and other purposes. The word was also used by the Greeks to mean the eyelet holes in the rim of a shield through which the soldier could with safety watch the enemy (Renbourn, 1959). The earliest reference to a miliary condition of the skin, propably any rash of papules or vesicles the size of millet seeds, is found in the Hippocratic works. Galen and later writers also used the word miliaria in reference to a variety of herpes - a condition, itself, was somewhat obscure. Examinations of the writings of the Arab physicians also show a number of references to a miliary rash. Haly Abbas in the 'King Book' wrote on smallpox and measles and said that they were sometimes associated with a 'miliary rash' (Renbourn, 1959).

* * *

In the nineteenth century, Robinson (1884) seemed to have been the first to recognize that miliaria is a disease of the sweat glands. He was the first to argue that obstruction of the ducts was the primary event in the pathogenesis of miliaria crystallina.

Pollitzer, in 1893, was the first to study miliaria in detail. His conclusions being based on the examination of serial sections from eight cases. He concluded that this condition was due to the occlusion of sweat ducts by swollen cells of the horny layer of the epidermis. He postulated that this swelling was due to the imbibition of excessive sweat. He further suggested that skin insufficiently supplied with fat was most apt to be the site of miliaria lesion.

Unna (1896) agreed with Pollitzer that the sweat pores are closed in miliaria, but disagreed as to the cause. Unna was disposed to think that miliaria is an inflammatory and infective disorder, but he did not specify the infecting agent.

Acton (1926) concluded that the initial major change in miliaria rubra was due to infection with Staphylococcus. The next year, Smith (1927) showed that pustule formation in relation to sweat ducts was a common finding in miliaria rubra but attributed the cause to a yeast-like fungus.

It was the World War II which precipitated systemic investigation of miliaria. 'Heat rash' was a common problem in troops deployed to the Pacific Theatre. Sulzberger & Emik (1946) reported that after some weeks in the tropics, two-third of naval personnel suffered much discomfort and distress from this source. The rash

one of a number of predisposing factors. Subsequent studies led him to postulate a key role for Staphylococcus aureus. He came to regard miliaria rubra as a staphylococcal infection of the sweat ducts. He published photos showing crowds of cocci colonizing the distal portion of the ducts. Moreover, he was able to produce miliaria rubra in volunteers by fastening to the skin agar plate cultures of S. aureus.

Shelley & Horvath (1950a,b) used a variety of experimental manoeuvers to produce miliaria: these included continuous wet dressing,iontophoretic current, occlusive adhesive tape and applications of aluminium chloride. They established that a variety of superficial injuries could cause parakeratotic and hyperkeratotic plugs to form in the distal portion of the sweat ducts.

These findings neatly interdigitated with the observations of Sulzberger (1946) and of O'Brien (1947 & 1950) and provided the foundation for current teaching of the origin of miliarial syndromes. Horny plugs was central in this version of pathogenesis. They prevent the delivery of sweat to the surface and their depth determines the level at which the sweat escapes into the tissue. Miliaria crystallina (intra-corneal vesicles) develops when the plug is situated in the horny layer, miliaria rubra when it is further down in the epidermis and finally miliaria profunda with dermal blockage(Holzle & Kligman, 1978).

This picture was fated to be disturbed by new findings.

Hambrick & Blank (1956) microscopically examined whole mounts of miliaria crystallina lesions and could not find plugs of any kind.

Dobson et al. (1957) reopened the field to critical thinking by following the very early histological events after different physical and chemical injuries. The skin quickly became anhidrotic after freezing, but the much described horny plugs were nowhere in evidence. The injury was severe enough to cause degeneration of the epidermal sweat duct unit. It was only after repair of this damage that parakeratotic plugs formed. They postulated that an accumulation of PAS-positive diastase resistant material in the ducts was responsible for obstructing the flow of sweat to the surface. They clearly perceived that anhidrosis developed in the absence of horny plugs and that these come later as a manifestation of the repair process.

Once more the tragedy of war, this time the Vietnam experience, brought to the fore the importance of miliaria rubra in limiting the effectiveness of fighting troops. The basic question remained: How does profuse sweating induce miliaria in persons who are newcomers to tropical areas ? In a return engagement with the problem, Sulzberger et al. (1967), at the Letterman Army Institute, developed an experimental model which perfectly mimicked the natural disease. This provided an unpreceded opportunity for examining the pathogenesis of miliaria. By wrapping up the

trunk with tightly fitting impermeable plastic film (Saran Wrap) for 2-4 days, they could regularly provoke miliaria rubra in heat-stimulated volunteers.

With this model, Stillman et al. (1971) studied the effect of various pretreatments, hoping to find an effective means of prophylaxis. Henning et al. (1972) used the same model to assess the role of bacteria in the pathogenesis of miliaria.

In still another study, Sulzberger & Harris (1972) tried to find out what the earliest anatomical changes were in their occlusion model. They carefully examined histological sections after various periods of occlusion. However, they were disappointed in not being able to identify any change that would explain the lack of sweating or how a heat stimulus precipitated miliaria. There was no visible obstruction, horny or otherwise.

Holzle & Kligman (1978) have reviewed the whole matter in detail. They performed a series of experiments in attempt to discover the nature of the obstruction leading to the development of anhidrosis and miliaria. They finally concluded that the resident microflora of the skin played the central role in the pathogenesis of miliaria.