Chapter 23
The Interaction of Fungi and Bacteria in the Pathogenesis of Athlete’s Foot

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The term “athlete’s foot” designates the itchy, scaly, toe-web lesions to which athletic young males are particularly prone. The clinical spectrum ranges from dry, mild, scaling (Fig. 23.1) to a painful, exudative, erosive, inflammatory process with fissuring (Fig. 23.3). The former is mainly asymptomatic and often subclinical. The variety which fits the most familiar image of the disease is characterized by scaly, soggy, whitish hyperkeratotic lesions associated with pruritus and foul odor (Fig. 23.2). Textbooks of dermatology always discuss interdigital athlete’s foot in the chapter on superficial fungus infections; various dermatophytes are cited as causative.5,14 It is established dogma that athlete’s foot is a ringworm infection.

This tidy concept is spoiled by the repeated finding that dermatophytic fungi frequently cannot be isolated in culture or demonstrated microscopically. The demonstration of fungi from clinically abnormal interspaces has been surprisingly low; in the majority of studies, fungi could be demonstrated in less than 25% of cases. The exceptions are Marples and Bailey,11 58% recovery (3); English and Gibson,4 34%; and Goto,4 who has set a record of 61% by a scrupulous search for fungi. Table 1 summarizes the clinical and mycologic data of different investigators. The contradiction of overt clinical disease in the absence of fungi is highlighted by Gentles and Evans’s finding that 40% of interspaces with typical peeling and scaling were mycologically negative.6 A further complication is that ringworm fungi have been found in up to 9% of normal interspaces (Table 23.1).

Another disquieting feature is that potent antifungal agents do not result in rapid clinical improvement. Tolnaftate, for example, penetrates skin well,15 but the therapeutic response is disappointing to many patients who want relief in less than two weeks. Likewise, oral griseofulvin, the drug par excellence for ringworm infections, is rather unimpressive in interdigital athlete’s foot. Altogether these observations suggest that fungi alone are insufficient to account for the clinical symptomatology.

We have found that resident bacteria collaborate with dermatophytic fungi to produce symptomatic athlete’s foot. Until now, bacteria have not been considered except for those instances in which infection by virulent organ-
Fig. 23.1. Dermatophytosis simplex. Dry, scaling, relatively symptomatic inter-space.

Fig. 23.2. Hyperkeratotic, whitish plaque. Fungi recovered in 55% of cases. Aerobic diphtheroids begin to predominate.