At the present time the importance of dematiaceous fungi as a source of human pathology is gaining recognition. Chromoblastomycosis is an outstanding example of the infections that may be produced by organisms of this group; it can be produced by any one of the 5 distinct species.* Although its morbidity is not especially high, it is by no means rare, for it occurs universally.

Numerous observations recently published have not only enhanced the original concept of the disease, but have also raised important and often confusing questions regarding diagnosis, pathogenesis and nomenclature.

It is my purpose in this communication to define the actual clinical status of chromoblastomycosis, to establish its differential diagnosis as compared with other dematiaceous infections and to comment on the question of nomenclature.

Chromoblastomycosis
Dermatological Picture

Chromoblastomycosis, also known as dermatitis verrucosa, is essentially a skin disease. It generally affects the distal portion of an extremity, although it may start on any other part of the skin.

The primary lesion is a small pink scaly papule frequently developing on the foot, quite often at the site of minor trauma. This papule is gradually transformed into a larger prominent and superficially verrucous nodule (Fig. 1). The nodule may remain as such indifferently, but it often spreads out to form a raised, more or less extensive superficially irregular plaque (Figs. 1, 2, 3). Or it may continue to develop, rising above the skin level to produce a larger papillomatous tumor reminiscent of a cauliflower (Fig. 4).

Chromoblastomycosis is a chronic, slowly progressive disease. The infection extends with the development of satellite lesions by way of the superficial lymphatics or by autoinoculation through scratching. New lesions may reproduce any of the morphologic patterns already described. Thus, in advanced cases of chromoblastomycosis the eruption usually is characteristically polymorphic, showing various types and numbers of lesions in different stages of development (Fig. 5). According to my experience, ulceration is not an inherent part of the pathologic process, but it does occur in some patients as a result of trauma or secondary infection (Fig. 6). Roentgenologic studies have revealed
exceptional cases where changes such as osteoporosis and osteoarthritis were produced, apparently as a collateral reaction on the bony structures underlying the affected skin. The mucous membranes do not appear to be particularly attractive to the fungi of chromoblastomycosis; however, slight invasion of the conjunctiva and nasal septum has been reported. Fernandez Baquero published a case of generalized chromoblastomycosis in which the toenails were involved.

A review of the literature on the subject will show that practically all cases reported are consistent with the dermatologic picture outlined here.

Potential Dissemination of Infection

Notwithstanding its unsightly, often repulsive appearance and the fact that the pathologic process may lead to incapacity, comparatively little importance was attached to this disease after its cause was discovered in 1911. However, the cases published in recent years indicate the widespread geographic distribution of the disease. They also show that the infecting fungus occasionally can break away from the cutaneous tissue, producing more dangerous complications.

In 1933 Carrión and Koppisch published unequivocal evidence of the occurrence of metastases to subcutaneous, lymphatic and muscular tissues in a Puerto Rican patient. Thereafter, other cases with subcutaneous metastases became known. In 1954 invasion of the central nervous system in a Congolese patient was reported by Lucasse et al. Later a similar case was discovered by Fukushiro et al. in Japan; more recently (1963) a third infection of the
brain caused by *Fonsecaea dermatitidis* was described by Shimazomo et al. A systemic infection, also by *F. dermatitidis,*" with involvement of the pancreas, liver, ileum, lymph glands, brain and meninges" was published by Tsai et al.

The potential dissemination of the infecting parasite in chromoblastomycosis patients becomes a tremendously important risk in the absence of specific therapy. Of course I am aware of the fact that systemic involvement is extremely rare. Notwithstanding this, the possibility of serious complications has become a matter of concern in ordinary cases of cutaneous chromoblastomycosis. Physicians should consider this disease and be prepared to make an early diagnosis. When the lesions are few and small, the infection can be completely eradicated.

Differential Diagnosis. The Encephalomyces

A considerable number of infections recently reported have been erroneously classified as chromoblastomycosis based only on the presence of pigmented fungal cells and hyphae in the pathologic tissue, without regard to the clinical picture and the particular species etiologically involved. This has actually happened with many encephalomyces of the type described as "cladosporiosis"*

*The name Cladosporiosis has been applied to fungal infections of the brain because many of those infections are produced by a species of cladosporium, *C. trichoides.* That name is evidently misleading. Other species of Cladosporium may produce pathologic conditions not affecting cerebral tissues, example: *C. carrionii.* Conversely, other species generically different from Cladosporium may produce brain infections, examples: *F. pedrosoi* and *F. dermatitidis.* Finally, cladosporiosis in man was originally described as a skin disease by M. Fernand Gueguen.*
by Emmons et al.,21 which is caused by Cladosporium trichoides.22 In practically all infections of this type already reported the clinical manifestations are indicative of primary damage to the central nervous system. Conversely, in chromoblastomycosis the skin is the habitual site of invasion. Furthermore, C. trichoides possesses distinct biologic properties that sets it apart from the fungi responsible for the latter disease.

It is now known that C. trichoides exceptionally may affect the skin.21 Similarly chromoblastomycosis, as already stated, occasionally may affect the central nervous system. Such exceptions do not invalidate the fact that we are dealing with two different clinical entities. All they mean is that the etiologic fungus in each case can depart from its normal behavior when conditions become favorable.

Hypodermomycosis

This is another type of dematiaceous infection that is attracting a great deal of interest and is also being confused with chromoblastomycosis.† Although the number of patients with this mycosis studied so far is comparatively limited, the clinical picture is so characteristic and constant in all the cases that recognition of the group as a separate entity appears to be in order.

The pathologic process begins with the development of an indolent, usually single, relatively small subcutaneous nodule often located on an exposed area of the body, where it becomes easily palpable under the healthy skin. The infection follows a chronic course. Central necrosis of the growing nodule sets in early and the lesion is transformed into an encapsulated abscess which may reach 2 cm or more in diameter and which shows practically no tendency to break out through the skin. Pigmented fungous elements including hyphae are constantly present in the exudate and wall of the abscess. The species usually cultured from the lesions is the so-called Sporotrichum gougerotii,† rarely P. richardsiae.21

According to the picture already outlined, the diagnosis of chromoblastomycosis can be excluded not only from the

† In 1967 Mariat23 proposed the name phaeosporotrichosis for this type of infection.
clinical point of view, but also etiologically. In one case the infection is primarily and essentially subcutaneous and it usually is represented by a single lesion; in the other, the pathologic process lies mostly on the skin proper, and shows a constant tendency to produce a variety of lesions. Finally, the causative agents specifically are different for each of the two diseases.

Systemic Infections

Primary dematiaceous infections of the internal organs have been so rarely recognized and described that our present knowledge about them is incomplete. Therefore, it is difficult to determine which of those infections can be classified as chromoblastomycosis, especially when cultures of the infecting fungi are not available.

Sasano and Okamoto reported a case of "primary chromoblastomycosis arising from the internal organs." It occurred in a poorly nourished 12-year-old child, who had "fever and swelling of the liver and died of cerebral symptoms . . . without dermal manifestations." Autopsy revealed "yellow-brown granulomas in the liver, in the lymph nodes of the abdomen and thorax, and also in the brain." Pigmented "bodies and hyphae" were observed in tissue sections, but the infecting fungus could not be isolated in culture. Although a diagnosis of chromoblastomycosis might come within the range of possibility in a case like this, it cannot be accepted as a scientific fact.

Another case reported as chromoblastomycosis by Rajam et al. deserves special consideration. The patient was a 7-year-old boy whose illness had started about the age of 2 as a skin eruption of the face that was classed as "chronic inflammation" by the pathologist. At the time of examination 5 years later, the general condition of the child was described as very poor. He then had a large number of discrete subcutaneous nodules, tense cystic swellings and drain-
naming is like that of the mycetomas, which it improves on by implying the location of the pathologic process in the name of the disease.

References


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