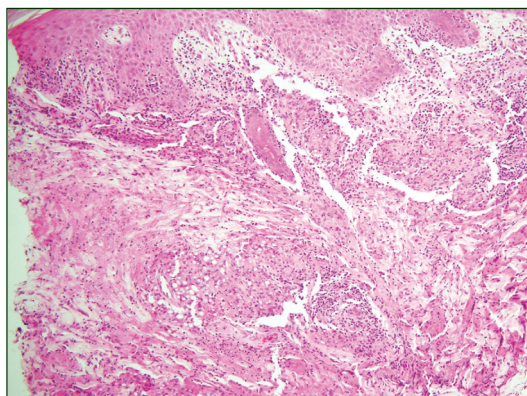


H&E, original magnification  $\times 400$ .



H&E, original magnification  $\times 40$ .

The best diagnosis is:

- a. cutaneous botryomycosis
- b. cutaneous leishmaniasis
- c. lepromatous leprosy
- d. cutaneous lobomycosis
- e. cutaneous protothecosis

PLEASE TURN TO PAGE 408 FOR DERMATOPATHOLOGY DIAGNOSIS DISCUSSION

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The authors report no conflict of interest.

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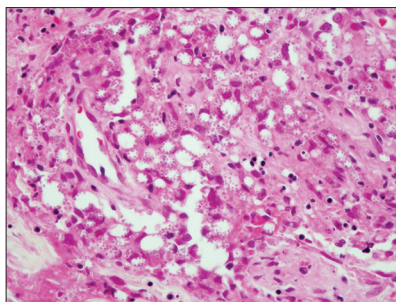
## Cutaneous Leishmaniasis

Cutaneous leishmaniasis is a parasitic infection caused by intracellular organisms found in tropical climates. Old World leishmaniasis is endemic to Asia, Africa, and parts of Europe, while New World leishmaniasis is native to Central and South Americas.<sup>1</sup> Depending upon a host's immune status and the specific *Leishmania* species, clinical presentations vary in appearance and severity, ranging from self-limited, localized cutaneous disease to potentially fatal visceral and mucocutaneous involvement. Most cutaneous manifestations of leishmaniasis begin as distinct, painless papules that may progress to nodules or become ulcerated over time.<sup>1</sup> Histologically, leishmaniasis is diagnosed by the identification of intracellular organisms that characteristically align along the peripheral rim inside the vacuole of a histiocyte.<sup>2</sup> This unique finding is called the “marquee sign” due to its resemblance to light bulbs arranged around a dressing room mirror (Figure 1).<sup>2</sup> *Leishmania* amastigotes (also known as Leishman-Donovan bodies) have kinetoplasts that are helpful in diagnosis but also may be difficult to detect.<sup>2</sup> Along with the *Leishmania* parasites, there typically is a mixed inflammatory infiltrate of plasma cells, lymphocytes, histiocytes, and neutrophils (Figure 2).<sup>1,2</sup> There also may be varying degrees of pseudoepitheliomatous hyperplasia and overlying epidermal ulceration.<sup>1</sup>

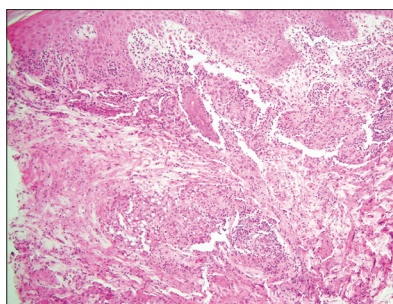
Cutaneous botryomycosis can present clinically as a number of various primary lesions, including papules, nodules, or ulcers that may resemble leishmaniasis.<sup>3</sup>

Botryomycosis represents a specific histologic collection of bacterial granules, most commonly caused by *Staphylococcus aureus*.<sup>3</sup> The dermal granulomatous infiltrate seen in botryomycosis often is similar to that seen in chronic leishmaniasis; however, one histologic feature unique to botryomycosis is the presence of characteristic basophilic staphylococcal grains that are arranged in clusters resembling bunches of grapes (the term *botryo* means “bunch of grapes” in Greek).<sup>3</sup> A thin, eosinophilic rim consisting of antibodies, bacterial debris, and complement proteins and glycoproteins may encircle the basophilic grains but does not need to be present for diagnosis (Figure 3).<sup>3</sup>

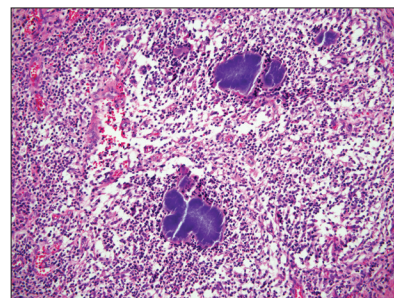
Lepromatous leprosy presents as a symmetric, widespread eruption of macules, patches, plaques, or papules that are most prominent in acral areas.<sup>4</sup> Perivascular infiltration of lymphocytes and histiocytes is characteristic of lepromatous leprosy.<sup>2</sup> Mycobacteria bacilli also are seen within histiocytic vacuoles, similarly to leishmaniasis; however, collections of these bacilli congregate within the center of a foamy histiocyte to form a distinctive histologic finding known as a globus. These individual histiocytes containing central globi are called *Virchow cells* (Figure 4).<sup>2</sup> However, lepromatous leprosy can be distinguished from leishmaniasis histologically by carefully observing the intracellular location of the infectious organism. Mycobacteria bacilli are located in the center of a histiocyte vacuole whereas *Leishmania* parasites



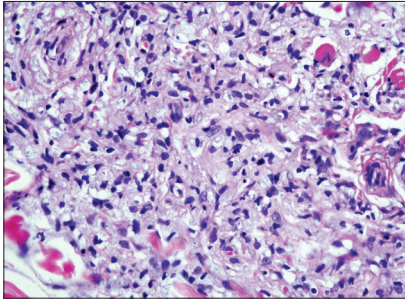
**Figure 1.** *Leishmania* organisms located along the periphery of intracellular histiocyte vacuoles, demonstrating the “marquee sign,” named for its resemblance to light bulbs arranged around a dressing room mirror (H&E, original magnification  $\times 400$ ).



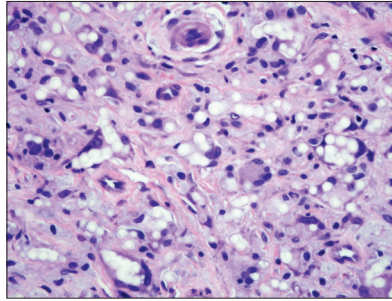
**Figure 2.** Granulomatous infiltration in the dermis consisting of plasma cells, histiocytes, and lymphocytes (H&E, original magnification  $\times 40$ ).



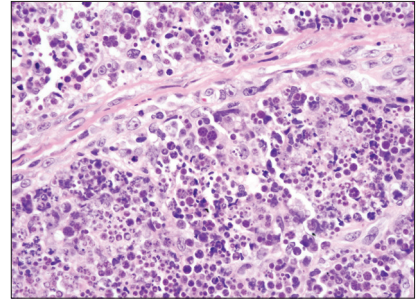
**Figure 3.** Characteristic basophilic staphylococcal grains surrounded by a thin, eosinophilic border seen in botryomycosis (H&E, original magnification  $\times 400$ ).



**Figure 4.** Virchow cells with central globi surrounded by perivascular infiltrate of lymphocytes and histiocytes that are characteristic of lepromatous leprosy (H&E, original magnification  $\times 400$ ).



**Figure 5.** Round, white, yeastlike organisms connected in a "string of beads" configuration in lobomycosis (H&E, original magnification  $\times 400$ ).



**Figure 6.** Protothecosis organisms in morula form within a histiocyte, creating an appearance similar to a soccer ball (H&E, original magnification  $\times 400$ ).

demonstrate a peripheral alignment along a histiocyte vacuole. If any uncertainty remains between a diagnosis of leishmaniasis and lepromatous leprosy, positive Fite staining for mycobacteria easily differentiates between the 2 conditions.<sup>2,4</sup>

Cutaneous lobomycosis, a rare fungal infection transmitted by dolphins, manifests clinically as an asymptomatic nodule that is similar in appearance to a keloid. Histologic similarities to leishmaniasis include pseudoepitheliomatous hyperplasia and dermal granulomatous inflammation.<sup>4</sup> The most distinguishing characteristic of lobomycosis is the presence of round, thick-walled, white organisms connected in a "string of beads" or chainlike configuration (Figure 5).<sup>2</sup> Unlike leishmaniasis, lobomycosis fungal organisms would stain positive on periodic acid–Schiff staining.<sup>4</sup>

Cutaneous protothecosis is a rare clinical entity that presents as an isolated nodule or plaque or bursitis.<sup>4</sup> It occurs following minor trauma and inoculation with *Prototheca* organisms, a genus of algae found in contaminated water.<sup>2,4</sup> In its morula form, *Prototheca*

adopts a characteristic arrangement within histiocytes that strikingly resembles a soccer ball (Figure 6).<sup>2</sup> Conversely, nonmorulating forms of protothecosis can also be seen; these exhibit a central basophilic, dotlike structure within the histiocytes surrounded by a white halo.<sup>2</sup> Definitive diagnosis of protothecosis can only be made upon successful culture of the algae.<sup>5</sup>

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