

## NOTES &amp; COMMENTS

**Disseminated coccidioidomycosis as a harbinger of climate change**

*To the Editor:* We read with great interest the case series from our colleagues at the University of California Irvine, in which 3 cases of primary cutaneous coccidioidomycosis were seen after the unusually heavy rainfalls experienced across California in 2016 and early 2017.

At the University of California San Francisco, we also experienced an unusually high incidence of coccidioidomycosis in late 2016. Last November, we saw 2 patients from the Central Valley with a recent history of immunosuppression. The first was a 64-year-old man 8 months after a liver transplant who presented after not responding to empiric treatment for community-acquired pneumonia, manifesting as cough, fevers, and hypoxemia. We were consulted for erythematous papulonodules with central umbilication and necrosis (Fig 1, A and B). The second was a 62-year-old woman, 5 months after renal transplant, who presented with cough and dyspnea, having not responded to 3 antibiotic courses for community-acquired pneumonia. We were consulted for a tender erythematous nodule with a dusky center (Fig 2) and discovered several smaller, faintly erythematous papules. In both cases, dermatopathology found Periodic acid–Schiff–diastase–positive organisms with endospore-packed capsules (Fig 3), consistent with disseminated coccidioidomycosis. Once diagnoses were established, both received liposomal amphotericin B and fluconazole and improved slowly over several weeks.

San Francisco is located approximately 200 miles from the San Joaquin River (or Central) Valley, where coccidioidomycosis is endemic. As such, during the previous 6 years, our consult service had seen only 6 cases of disseminated coccidioidomycosis. We discovered that our unusually coincident cases represented an epidemic declared in late 2016.<sup>1</sup> In fact, more cases were diagnosed in 2016 than in any year since 1995.<sup>2</sup> Given that our patients hailed from the Central

Valley, we surmised that we were experiencing a spillover effect from an epidemic triggered by heavy rainfalls.

Our colleagues at the University of California Irvine reported cases in patients living outside the endemic region. This represents a concerning trend—coccidioidomycosis has recently been identified in the soil in Oregon,<sup>3</sup> and diagnosed in patients in Washington with negative travel histories.<sup>4</sup> County-based data from the California Department of Public Health reveal that the recent epidemic mainly affected the Central Valley. However, certain counties outside this region (including Los Angeles and San Luis Obispo counties) have seen a consistent increase in cases during the last 6 years.<sup>2</sup>

We agree with our colleagues' assessment that climate change may be contributing to the increasing incidence of coccidioidomycosis. The organism thrives in arid environments, and during prolonged droughts, its spore form enables it to outcompete local bacterial populations. In California, climate change is projected to lead to prolonged droughts and decreased snowpack in the Sierra Nevada and therefore lower soil moisture. After earthquakes or heavy rainfall, coccidioidomycosis epidemics may become an increasing threat to public health.

The current political atmosphere has made it difficult to acknowledge the realities of climate change and take meaningful action. However, the impact of climate change on human health and productivity should spur concern that transcends party lines. Dermatologists should be aware of the widening geographic distribution of coccidioidomycosis and other environmentally sensitive diseases.

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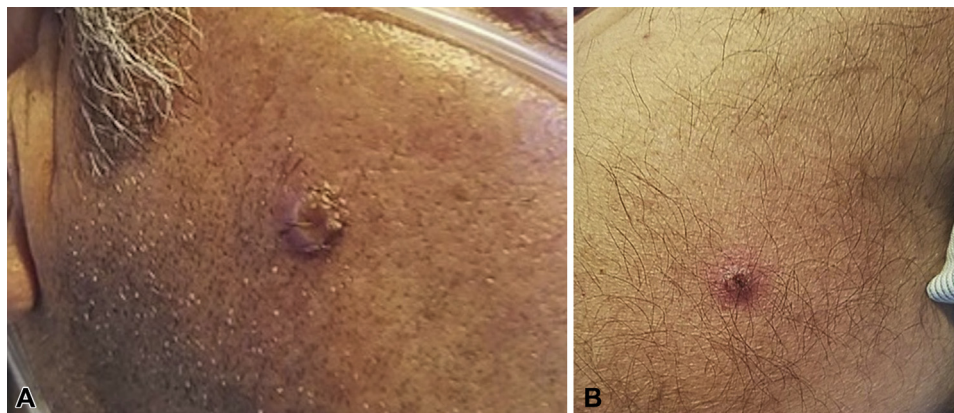
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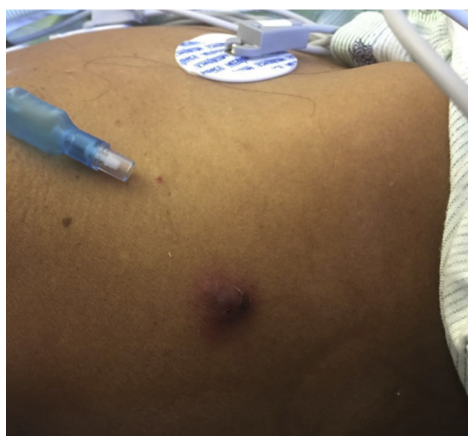
*Conflicts of interest: None declared.*

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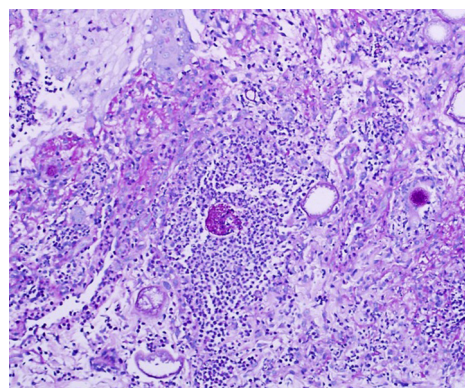
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**Fig 1.** A and B, Discrete, tender erythematous papulonodules with central umbilication and dusky center suggestive of necrosis.



**Fig 2.** Tender 1.5-cm erythematous nodule with a dusky center located on right superior shoulder.



**Fig 3.** Periodic acid–Schiff–diastase–positive organisms with large capsules packed with endospores, consistent with a diagnosis of disseminated coccidioidomycosis.

#### REFERENCES

1. Cooksey GS, Nguyen A, Knutson K, et al. Notes from the field: increase in coccidioidomycosis — California, 2016. *MMWR Morb Mortal Wkly Rep*. 2017;66:833–834.
2. California Department of Public Health. *Epidemiologic Summary of Coccidioidomycosis in California, 2016* [Internet]; 2017. Sacramento, CA. Available from: [https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH Document Library/CocciEpiSummary2016.pdf](https://www.cdph.ca.gov/Programs/CID/DCDC/CDPH%20Document%20Library/CocciEpiSummary2016.pdf).
3. Hawryluk M. *Traces of Valley Fever fungus found in Central Oregon*. Bull [Internet]; 2016. Bend, Oregon. Available from: <http://www.bendbulletin.com/home/4524652-151/traces-of-valley-fever-fungus-found-in-central%0D%0A>.
4. Stockamp NW, Thompson GR. Coccidioidomycosis. *Infect Dis Clin North Am*. 2016;30:229–246.

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