

## Sources of Valley Fever (Coccidioidomycosis)

### Where does *Coccidioides* live?

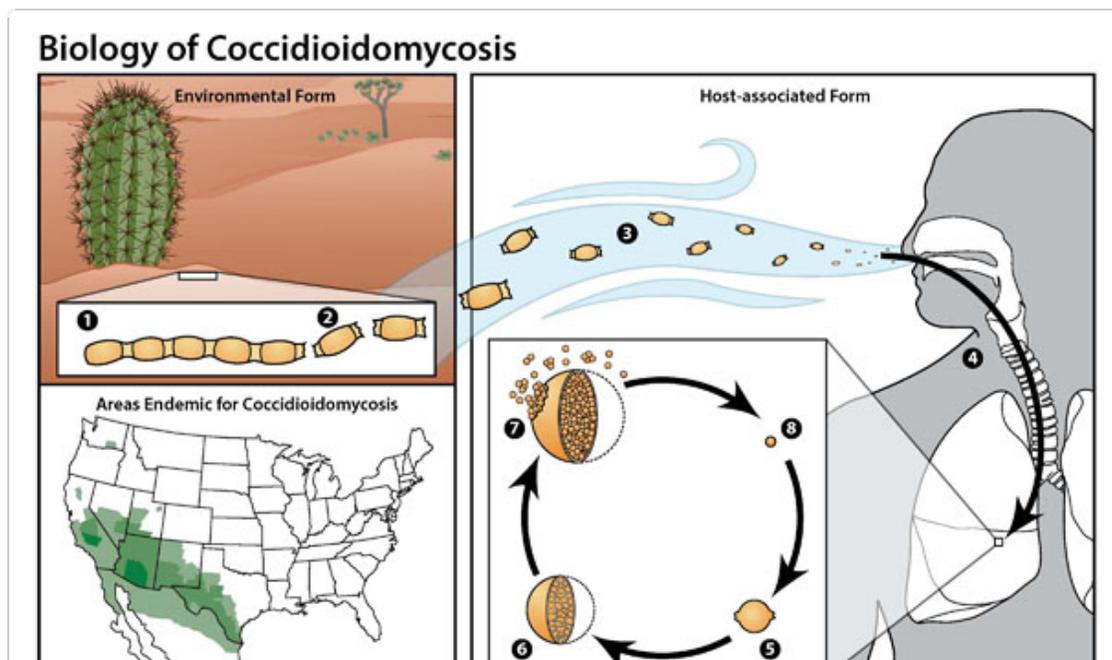
*Coccidioides* lives in dust and soil in some areas in the southwestern United States, Mexico, and South America. In the United States, *Coccidioides* lives in Arizona, California, Nevada, New Mexico, Texas, and Utah. The fungus was also recently found in south-central Washington.<sup>1(#one)</sup>

This map shows the approximate areas (called “endemic areas”) where *Coccidioides* is known to live or is suspected to live in the U.S. and Mexico.<sup>1(#one)-6(#six)</sup> Much of what is known about where the fungus lives in the southwestern U.S. is based on studies performed in the late 1940s and early 1950s.<sup>2(#two)</sup>

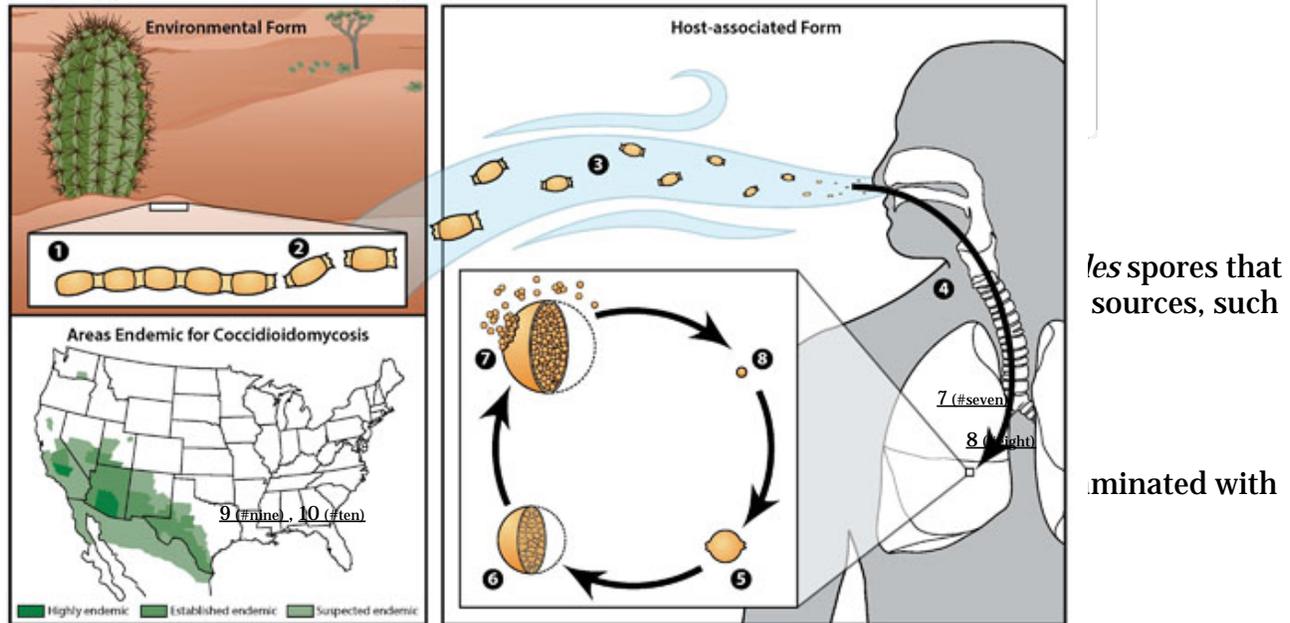
### Life cycle of *Coccidioides*

*Coccidioides* spores circulate in the air after contaminated soil and dust are disturbed by humans, animals, or the weather. The spores are too small to see without a microscope. When people breathe in the spores, they are at risk for developing valley fever. After the spores enter the lungs, the person’s body temperature allows the spores to change shape and grow into spherules. When the spherules get large enough, they break open and release smaller pieces (called endospores) which can then potentially spread within the lungs or to other organs and grow into new spherules.

Click here for the [PDF version of image](#)  [PDF - 1 page] (/fungal/pdf/coccidiomycosis-lifecycle508c.pdf) for printing.



## Biology of Coccidioidomycosis



In the environment, *Coccidioides* spp. exists as a mold (1) with septate hyphae. The hyphae fragment into arthroconidia (2), which are easily aerosolized when disturbed (3). Arthroconidia are inhaled by a person. Inside the body, they develop into spherules (4). A magnified view of the spherule cycle shows: (5) a spherule with endospores, (6) a spherule filled with endospores, (7) a ruptured spherule releasing endospores, and (8) a new spherule forming. Endospores are then able to develop into new spherules.



Testing soil for *Coccidioides* is sometimes done as a research activity. Here, Thomas Mace, senior scientific adviser to NASA, helps Cal State Bakersfield microbiologist Antje Lauer collect soil samples in Central CA to test for *Coccidioides*. Credit: Shelby Mack/ The Bakersfield Californian.

I'm worried that *Coccidioides* is in the soil near my home. Can someone test the soil to find out if the fungus is there?

No, in this situation, testing soil for *Coccidioides* isn't likely to be useful because the fungus is thought to be common in the soil in certain areas. A soil sample that tests positive for *Coccidioides* doesn't necessarily mean that the soil will release the fungus into the air and cause infection. Also, there are no commercially-available tests to detect *Coccidioides* in soil. Testing soil for *Coccidioides* is currently only done for scientific research.

### Testing soil for research

Scientists sometimes test soil or other environmental samples for *Coccidioides* to understand more about its habitat and how weather or climate patterns may affect its growth. The available methods to detect *Coccidioides* in the soil don't always detect *Coccidioides* spores

even if they are present. However, new tests are being developed so that researchers can better detect *Coccidioides* in the environment.

## Valley fever and the weather

Scientists continue to study how weather and climate patterns affect the habitat of the fungus that causes valley fever. *Coccidioides* is thought to grow best in soil after heavy rainfall and then disperse into the air most effectively during hot, dry conditions.<sup>11 (#eleven)</sup> For example, hot and dry weather conditions have been shown to correlate with an increase in the number of valley fever cases in Arizona<sup>12 (#twelve)</sup> and in California (but to a lesser extent).<sup>13 (#thirteen)</sup> The ways in which climate change may be affecting the number of Valley fever infections, as well as the geographic range of *Coccidioides*, isn't known yet, but is a subject for further research.

## References

1. Marsden-Haug N, Goldoft M, Ralston C, Limaye AP, Chua J, Hill H, et al. Coccidioidomycosis acquired in Washington State. *Clin Infect Dis*. 2013 Mar;56(6):847-50.
2. Edwards PQ, Palmer CE. Prevalence of sensitivity to coccidioidin, with special reference to specific and nonspecific reactions to coccidioidin and to histoplasmin. *Diseases of the chest*. 1957 Jan;31(1):35-60.
3. Werner SB, Pappagianis D. Coccidioidomycosis in Northern California. An outbreak among archeology students near Red Bluff. *California medicine*. 1973 Sep;119(3):16-20.
4. Werner SB, Pappagianis D, Heindl I, Mickel A. An epidemic of coccidioidomycosis among archeology students in northern California. *N Engl J Med*. 1972 Mar 9;286(10):507-12.
5. Petersen LR, Marshall SL, Barton-Dickson C, Hajjeh RA, Lindsley MD, Warnock DW, et al. Coccidioidomycosis among workers at an archeological site, northeastern Utah. *Emerg Infect Dis*. 2004 Apr;10(4):637-42.
6. Hector RF, Laniado-Laborin R. Coccidioidomycosis--a fungal disease of the Americas. *PLoS medicine*. 2005 Jan;2(1):e2.
7. Dierberg KL, Marr KA, Subramanian A, Nace H, Desai N, Locke JE, et al. Donor-derived organ transplant transmission of coccidioidomycosis. *Transpl Infect Dis*. 2012 Jun;14(3):300-4.
8. Eckmann BH, Schaefer GL, Huppert M. Bedside Interhuman Transmission of Coccidioidomycosis Via Growth on Fomites. An Epidemic Involving Six Persons. *Am Rev Respir Dis*. 1964 Feb;89:175-85.
9. Dweik M, Baethge BA, Duarte AG. Coccidioidomycosis pneumonia in a nonendemic area associated with infliximab. *South Med J*. 2007 May;100(5):517-8.
10. Stagliano D, Epstein J, Hickey P. Fomite-transmitted coccidioidomycosis in an immunocompromised child. *Ped Infect Dis J*. 2007 May;26(5):454-6.
11. Smith CE, Beard RR, et al. Effect of season and dust control on coccidioidomycosis. *JAMA*. 1946 Dec 7;132(14):833-8.

Page last reviewed November 26, 2014

Page updated by N. Sigler, MD, Park B, J. Nigam, K. Vaz, V. Komatsu K, McRill C, Phelan M, et al. An epidemic of coccidioidomycosis

in Arizona associated with climatic changes, 1998-2001. *J Infect Dis*. 2005 Jun 1;191(11):1981-7.

Content source: Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

Division of Field Epidemiology, Valamante J, Chinnamono D, et al. Valley fever incidence in Kern County, California. *Int*

*J Biometeorol*. 2006 Jan;50(3):174-82.

Centers for Disease Control and Prevention 1600 Clifton Road Atlanta, GA 30329-4027, USA  
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - [Contact CDC-INFO](#)