About the Author

Dr. Baptista is a veterinarian and a PhD student in biodiversity, genetics, and evolution at University of Porto Research Centre in Biodiversity and Genetic Resources, Vairão, Portugal. Her areas of clinical interest include epidemiology, infectious diseases, behavior, and One Health.

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Address for correspondence: Carolina Baptista, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Universidade do Porto, Vairão, Portugal; email: carolina.baptista@cibio.up.pt

Increased Rates of *Purpureocillium lilacinum* Mold among Laboratory Culture Results, United States

Dallas J. Smith, Luisa F. López, Meghan Lyman, Claire Paisley-Jones, Kaitlin Benedict

Author affiliations: Centers for Disease Control and Prevention, Atlanta, Georgia, USA (D.J. Smith, L.F. López, M. Lyman, K. Benedict); US Department of Agriculture, Washington, DC, USA (C. Paisley-Jones)

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Purpureocillium lilacinum, a common environmental mold and bionematicide, can cause human infections. At a major US commercial laboratory during March 2019–February 2025, *P. lilacinum* culture rates increased; rates were highest in the South Atlantic and Pacific states. Nonculture-based diagnostic tools such as microscopy may help identify and confirm clinical infection earlier.

Purpureocillium lilacinum (formerly *Paecilomyces lilacinus*) is a naturally occurring filamentous fungus that is common in the environment, particularly in soil and decaying vegetation (*1*). Two strains of *P. lilacinum* registered in 2005 and 2021 are used as agricultural bionematicides in the United States (*2*,*3*). The fungus rarely causes human infection but can cause hyalohyphomycosis, an infection with varied clinical soft-tissue, ocular, or pulmonary manifestations. Infection most frequently affects immunocompromised persons but can also occur in immunocompetent persons. Mortality rates can reach 20% (*1*).

P. lilacinum infection is clinically indistinguishable from other mold infections, and the organism resembles other molds on cytology, histopathology, and culture, potentially leading to misidentification and to delayed or inappropriate treatment (*1*). *P. lilacinum* is intrinsically resistant to amphotericin B and can be correlated with poorer treatment outcomes (*1*,*4*).

Worldwide, clinical characteristics and outcomes of 101 *P. lilacinum* infections have been described, 31 of which were from the United States, but epidemiology of the infection in the United States is poorly understood (*1*). We explored *P. lilacinum* culture data from a large national commercial laboratory to describe this organism in the United States.

We used data from the Centers for Disease Control and Prevention's National Syndromic Surveillance Program (NSSP) (https://www.cdc.gov/nssp/index.html), which collects data from Labcorp (https://www.labcorp.com), a major national commercial laboratory network. Labcorp transmits test orders and results for all reportable diseases in the United States to NSSP. Although *P. lilacinum* infection is not reportable to public health authorities, NSSP receives data on all fungal cultures performed at Labcorp because other fungal diseases are reportable (*5*). We identified culture results for *P. lilacinum* ordered during March 1, 2019 (earliest available data) through February 28, 2025.

We examined demographic characteristics, geographic location of submitting provider's state (US Census division), specialty or setting of the ordering healthcare provider, specimen type, and time from test order to culture result. Unique patient identifiers were unavailable; therefore, we conducted analyses at the test-result level.

We identified 1,180 *P. lilacinum* cultures (Table; Appendix Figure 1, https://wwwnc.cdc.gov/EID/article/31/10/25-0715-App1.pdf). Rates of *P. lilacinum* per 100,000 fungal cultures per year increased from 56.6 in 2019 to 74.3 in 2024 and peaked at >90 in the third quarter of 2024 (Figure). Overall, male persons (68.8/100,000 population) and persons ≥65 years of age (89.7/100,000 population) had the highest culture rates. By US Census division, the South Atlantic (110.6/100,000 population) and Pacific (100.3/100,000 population) divisions had the highest rates. Most (52%) *P. lilacinum* cultures were ordered from hospital settings. Specimen type was available for 57% of cultures, among which respiratory specimens were most common (38%). The median time from collection to result was 23 (interquartile range 15.0–33.0) days.

Those commercial laboratory data suggest a recent increase in *P. lilacinum* cultures in the United States and a wide geographic distribution. Higher rates among male persons and older persons align with a previous study of *P. lilacinum* infections (*1*). The long time (>3 weeks) for culture growth and identification for this mold might lead to diagnostic delays and potentially inappropriate treatment (*1*,*4*).

The South Atlantic and Pacific Census divisions had substantially higher *P. lilacinum* culture rates than other regions of the United States. The high rates in the Pacific region could reflect a substantial uptick in cultures from that area during 2024–2025, including 60 cultures from a single facility that was the subject of a public health investigation (*6*). That event represented a pseudo-outbreak from environmental contamination rather than a true clinical outbreak, which is a rare occurrence. A previous *P. lilacinum* outbreak was linked to contaminated skin lotion (*7*). Two strains of *P. lilacinum* are used in the United States as agricultural bionematicides, PL251 registered in 2005 and PL11 registered in 2021 (*2*,*3*). Use of those bionematicides could possibly contribute to increased environmental presence and culture contamination during collection or in laboratories.

Table. Patient characteristics in study of increased rates of *Purpureocillium lilacinum* mold among laboratory culture results, United States*

Characteristic	Value	Rate†
Year of sample collection, n = 1,180		
2019	136 (12)	56.6
2020	134 (11)	50.5
2021	182 (15)	59.3
2022	224 (19)	71.7
2023	210 (18)	62.8
2024	258 (22)	74.3
2025	36 (3)	61.9
Median patient age, y (IQR)	65.0 (53.0–74.0)	
Age group, y, n = 1,175		
0–17	40 (3)	21.6
18–44	154 (13)	41.0
45–64	357 (30)	59.7
≥65	624 (53)	89.7
Sex, n = 1,159		
M	607 (52)	68.8
F	552 (48)	58.9
US Census division, n = 1,172‡		
East North Central	91 (8)	69.1
East South Central	139 (12)	78.9
Middle Atlantic	11 (1)	3.6
Mountain	13 (1)	11.6
New England	<10 (<1)	28.7
Pacific	263 (22)	100.3
South Atlantic	603 (51)	110.6
West North Central	<10 (<1)	6.7
West South Central	44 (4)	17.3
Provider type, n = 1,100		
Hospital	567 (52)	
Family practice or internal medicine	132 (12)	
Dermatology	111 (10)	
Podiatry	71 (6)	
Pulmonary disease	55 (5)	
Otolaryngology	45 (4)	
Ophthalmology	14 (1)	
Other	105 (10)	
Median days from collection to result (IQR)	23.0 (15.0–33.0)	
Specimen type, n = 670		
Respiratory	254 (38)	
Nail	106 (16)	
Skin	82 (12)	
Sinonasal	13 (2)	
Eye	12 (2)	
Isolate	183 (27)	
Other	20 (3)	

*Values are no. (%) except as indicated. IQR, interquartile range.
†Positive results/100,000 cultures. Fungal cultures identified by Logical Observation Identifier Names and Codes nos. 188243, 188573, 188805, 42804–5, and 580–1.
‡US Census, https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf.

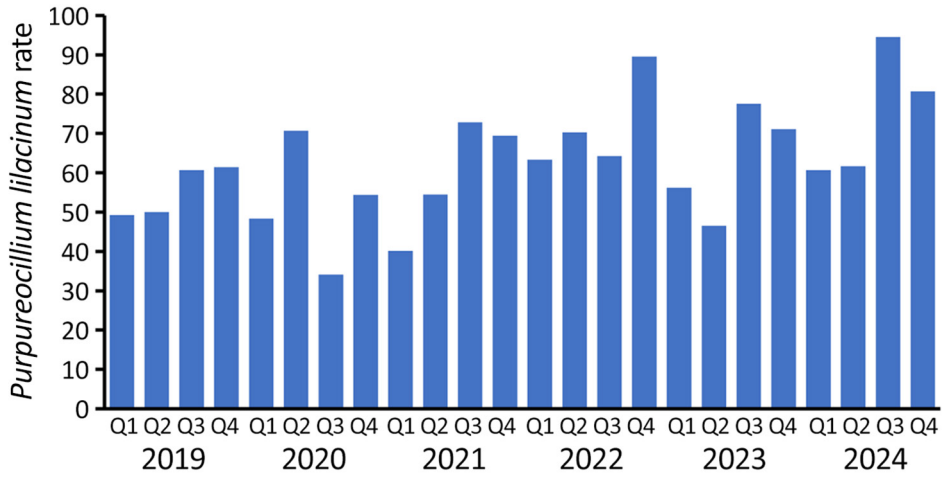

Figure. Rates of *Purpureocillium lilacinum* mold among laboratory culture results, United States. Graph shows *P. lilacinum* cultures per 100,000 fungal cultures by year and quarter during March 2019–February 2024.

Internationally, at least 1 case of subcutaneous *P. lilacinum* infection has been reported in association with bionematicide use (*8*). We could not assess environmental exposures in patients from whom the cultures in our study were derived; more data are needed on potential *P. lilacinum* environmental sources and their correlation with clinical culture positivity and infection risk.

Without clinical data, we were unable to determine patients' underlying medical conditions and whether cultures represented true infection versus colonization. The most common specimen source was the respiratory tract, which can be colonized with various molds. Furthermore, nearly half of cultures were missing specimen type information, likely skewing our results; however, another study of confirmed infections found that skin was the most common infection site (*1*). Last, our data are a convenience sample and might not necessarily represent the entire US population.

In summary, mold infections generally are associated with substantially delayed and missed diagnoses (*9*). Further investigations are needed to understand the increased *P. lilacinum* culture rates, including examining bionematicide use, environmental changes, and clinical effects. Because *P. lilacinum* culture rates appear to be increasing, clinicians could consider nonculture-based diagnostic tools, such as microscopy (Appendix Figure 2), to help identify and confirm clinical infection earlier.

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About the Author

Dr. Smith is an epidemiologist with the Mycotic Diseases Branch, Division of Foodborne, Waterborne, and Environmental Diseases, National Center for Zoonotic and Emerging Infectious Diseases, Centers for Disease Control and Prevention. His main research interests include environmental molds, fungal neglected tropical diseases, and antifungal stewardship.

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Address for correspondence: Dallas J. Smith, Centers for Disease Control and Prevention, 1600 Clifton Rd NE, Mailstop H24-11, Atlanta, GA 30329-4018, USA; email: rhq8@cdc.gov

Angiostrongylus cantonensis Lungworms in Definitive and Intermediate Hosts, Madagascar, 2024

Lanto A. Maminirina, Zaïna I. Bodoarison, Minoarisoa Rajerison, Séverine Ferdinand,[1] Beza Ramasindrazana[1]

Author affiliations: Université de Fianarantsoa, Fianarantsoa, Madagascar (L.A. Maminirina); Unité Peste, Institut Pasteur de Madagascar, Antananarivo, Madagascar (L.A. Maminirina, Z.I. Bodoarison, M. Rajerison, B. Ramasindrazana); Université d'Antananarivo, Antananarivo (L.A. Maminirina, Z.I. Bodoarison, M. Rajerison, B. Ramasindrazana); Unité Environnement–Santé, Equipe Ecologie Microbienne, Institut Pasteur de la Guadeloupe, Guadeloupe, France (S. Ferdinand)

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We assessed the prevalence of the rat lungworm, *Angiostrongylus cantonensis*, in rats and snails in Toamasina, Madagascar, using molecular techniques. Although no human cases of neuroangiostrongyliasis have been reported in Madagascar, the pathogen's presence in definitive hosts (2.5%, 2/78) and intermediate hosts (26.9%, 35/130) reveals active circulation and potential zoonotic risk.

[1]These authors contributed equally to this article.

The rat lungworm, *Angiostrongylus cantonensis* (Strongylida: Angiostrongylidae), first identified and described in China in 1935 (*1*), is responsible for neuroangiostrongyliasis, which can cause neurologic damage, such as eosinophilic meningitis or encephalitis, in humans. The life cycle of this parasitic nematode involves rats as definitive host and snails and slugs as intermediate hosts; humans act as incidental hosts only in this system (*2*).

Neuroangiostrongyliasis is a foodborne disease, contracted by humans through accidental ingestion of the *A. cantonensis* infective larvae; several thousand human cases have been documented worldwide (*3*). The infective larva can be found not only in intermediate hosts but also in paratenic hosts (e.g., crustaceans, frogs), on contaminated vegetables, and in water (*2*,*4*).

In Madagascar, *A. cantonensis* worms were first sampled in 1964 (*5*) in rats from Ambavaniasy, Alaotra Mangoro Region, and later confirmed in *Rattus* spp. rats (*6*). The parasite was reported in rats captured in Antananarivo in 1982 (*7*); prevalence was 12% during the rainy season and 5% during the dry season. Human cases of neuroangiostrongyliasis on the neighboring islands of Mayotte and La Reunion have been reported (*2*). In addition, human breeding and consumption of intermediate hosts of this parasite, specifically snails of the genus *Achatina*, are still taking place on the island; however, data on the potential role of this snail as a carrier of *A. cantonensis* worms are currently unavailable. In this context, the aim of this study was to update the occurrence of *A. cantonensis* worms in rats and investigate their presence in snails.

We trapped rats and collected snails in March 2024 in 3 communes in Toamasina district: Fanandrana, Antetezambaro, and Ankirihiry (Appendix, https://wwwnc.cdc.gov/EID/article/31/10/24-1741-App1.pdf). Further, we collected snails of the genus *Achatina* (Figure 1, panel A) and sampled and preserved a portion of the foot of each snail for molecular screening for the presence of *A. cantonensis* worms. After DNA extraction, we performed conventional PCR targeting the cytochrome c gene to confirm the identity of adult lungworms (Appendix). Further, we performed molecular screening of *A. cantonensis* worms using TaqMan quantitative PCR (Thermo Fisher Scientific, https://www.thermofisher.com) targeting the internal transcribed spacer gene (Appendix). We used the χ^2 test to compare the statistical differences in intermediate host infection by localities.

We captured a total of 78 individual rats of 2 species, 76 *Rattus rattus* rats and 2 *R. norvegicus* rats; 61.5% (48/78) were male and 38.4% (30/78) were